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THESIS

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AN ANALYSIS OF THE EDUCATIONAL OBJECTIVES IN THE AREA OF INVENTORY MANAGEMENT FOR SUPPLY CORPS OFFICERS ATTENDING THE NAVAL POSTGRADUATE SCHOOL

By

Robert Louis Logue, Jr.

And

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June 1988

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A Supply Corps officers' knowledge of inventory management principles serves as the keystone of his professional career development. This thesis is an analysis of the Naval Postgraduate School (NPS) course titled Inventory Management (MN3377) that is required to be taken by the majority of Supply Corps officers who attend NPS. The thesis traces the development of the text for the course, (Naval Supply Systems Command (NAVSUP) Publication 553, Inventory Management) and of the course itself. The thesis evaluates whether the text and course are presently meeting the needs of the Navy. Based on this evaluation, a recommendation is made to revise the emphasis and content of the course. A revised course outline and learning objectives are presented. Additionally, Chapter 1 of NAVSUP Publication 553, entitled "Supply Systems Overview and Basic Inventory Management Concepts", was revised and expanded, and is included as a part of this thesis.

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An Analysis of the Educational Objectives in the Area of Inventory Management for Supply Corps Officers Attending the Naval Postgraduate School

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Submitted in partial fulfillment of the
requirements for the degree of

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from the

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June 1988

ABSTRACT

A Supply Corps officers' knowledge of inventory management principles serves as the keystone of his professional career development. This thesis is an analysis of the Naval Postgraduate School (NPS) course titled Inventory Management (MN3377) that is required to be taken by the majority of Supply Corps officers who attend NPS. The thesis traces the development of the text for the course, (Naval Supply Systems Command (NAVSUP) Publication 553, Inventory Management) and of the course itself. The thesis evaluates whether the text and course are presently meeting the needs of the Navy. Based on this evaluation, a recommendation is made to revise the emphasis and content of the course. A revised course outline and learning objectives are presented. Additionally, chapter 1 of NAVSUP Publication 553, entitled "Supply Systems Overview and Basic Inventory Management Concepts", was revised and expanded, and is included as a part of this thesis.

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I. INTRODUCTION

A. BACKGROUND

A majority of Supply Corps Officers attending the Naval Postgraduate School are required to enroll in a one quarter course titled Inventory Management (MN3377). Most students take the course in the fifth quarter of a six quarter Master's degree program. The course was developed in response to the direction of the Chief of the Supply Corps during a 1982 curricula review. This course is intended for Supply Corps officers pursuing degrees in all Administrative Sciences curricula except the Systems Inventory Management curriculum. The text used for this course is Naval Supply Systems Command Publication 553, Inventory Management. The sponsor for the course and publication is the Naval Supply Systems Command.

Both the Naval Postgraduate School faculty and NAVSUP personnel have found NAVSUP P-553 to be in need of substantial revision since its publication in 1984. NPS faculty members Alan McMasters and Thomas Moore decided that the MN3377 Inventory Management course could be significantly improved by rewriting and enhancing NAVSUP P-553. They further determined that this revision would provide for a number of challenging student thesis projects. Prior to initiating this revision process, the

NPS Administrative Science Curricular Officer, Commander John Jackson, requested that the entire course structure be examined. He had received a considerable amount of formal and informal feedback which suggested that the course itself may not be meeting the needs of student officers in the Supply Corps or of NAVSUP, as the sponsor of the course. In response to this, Commander John Jackson suggested that an initial thesis project should be done which investigated the educational needs of the students who will take MN3377 in the future.

B. THESIS OBJECTIVE

This thesis examines a number of questions concerning the Inventory Management course and the NAVSUP Publication 553. The thesis has four primary goals.

The first goal is to examine the development of the course and determine if it evolved in accordance with the original intent of the Chief of the Supply Corps. Secondly, the current course is evaluated for its applicability to the target audience and the current needs of the Supply Corps. This evaluation will determine what format for an inventory management course would best complement the existing curricula and courses. Based on the results of this analysis, recommendations are made regarding future course direction and content. A third goal is to survey the adequacy of the NAVSUP P-553 as the Navy's primary reference manual for Inventory Management and as the primary text for MN3377. Finally, as an initial effort to improve NAVSUP P-553, Chapter 1 of the publication was rewritten and expanded.

C. PREVIEW

Chapter II provides the historical background for the development of the Inventory Management course. This history was obtained in personal interviews with several participants and from NAVSUP headquarters documentation. The MN3377 course, in its present format, is described in Chapter III. Chapter IV presents the results of a survey of MN3377 alumni and a comparative analysis which includes other Navy inventory management courses taught at the inventory control points and the Navy Supply Corps School. Chapter V compares the existing course structure with a recommended, revised outline and learning objectives for MN3377. Finally, Chapter VI contains a summary and makes recommendations concerning the future direction of the course and the NAVSUP P-553.

II. COURSE AND TEXTBOOK HISTORY

A. BACKGROUND

When Rear Admiral A. A. Giordano became the Chief of the Supply Corps, one of his goals was to reduce the number of Supply Corps Officers selected to pursue government sponsored graduate education at private and state universities and to send those students to the Naval Postgraduate School instead [Ref. 1]. He sought to achieve this goal for two reasons. First, he wanted to stem the loss he perceived was occurring in the late seventies and early eighties of postgraduate talent from the Supply Corps. Rear Admiral Giordano stated that Supply Corps Officers armed with advanced degrees awarded by prestigious civilian institutions found employment outside the military extremely lucrative [Ref. 1]. A high percentage of these officers were induced to separate from the Navy after completing their payback obligation or retire at the first opportunity. In short, the Supply Corps was not realizing an acceptable return on the expensive investment made when sponsoring Supply Corps Officers for graduate education at civilian universities. Rear Admiral Giordano discerned that Supply Corps Officers earning a Master of Science in Management at the Naval Postgraduate School would not be as marketable in the civilian sector, while at the same time these graduates would provide the Supply Corps with the pool of postgraduate talent needed to adequately staff required subspecialty coded billets [Ref. 1].

Secondly, Rear Admiral Giordano wanted Naval Supply Systems Command (NAVSUP) input to be considered in the design of the curricula and courses in which Supply Corps Officers were enrolled. NAVSUP had no influence in determining the curriculum structure or course content administered by civilian institutions. However, as a sponsor or co-sponsor for several of the curricula offered by the Administrative Sciences Department at the Naval Postgraduate School, NAVSUP could exert a significant influence in both curriculum and course development.

At his first opportunity, Rear Admiral Giordano requested a change to an existing course offered by the Administrative Sciences Department entitled Material Logistics (MN3372) [Ref. 2:p. 1]. During a curricula review at which he presided in June 1982, he expressed dissatisfaction with several aspects of the existing course and asked that the material requirements determination segment of the course be improved and the textbook then being used be replaced [Ref. 2:p. 1]. He also directed that the course be identified as a requirement for all Supply Corps Officers enrolled at the Naval Postgraduate School.

Specifically, Rear Admiral Giordano asked that the mathematical models used by the Navy Inventory Control Points (ICPs) in the requirements determination process be taught [Ref. 2:p. 1]. He believed that all Supply Corps Officers should possess a firm understanding of the basics of requirements determination. To illustrate this assertion, Rear Admiral Giordano often used a simple analogy,

> Just as every Line Officer must understand the basics of navigation, every Supply Corps Officer must understand the principles of requirements determination. [Ref. 1]

With this stated philosophy as the driving force for change, action items were agreed upon between NAVSUP and the Naval Postgraduate School to accomplish the requested improvements [Ref. 2:p. 1].

B. COURSE AND TEXT DEVELOPMENT

The Administrative Sciences Curricular Officer at NPS, Commander R. B. Renner, was given the responsibility for revising the requirements determination segment of Material Logistics (MN3372), since he was then teaching the course, and for establishing the course as a requirement for all Supply Corps Officers. Commander J. H. Perry, in charge of NAVSUP's Operations and Inventory Analysis Staff Division (NAVSUP-04A; now NAVSUP-042), was directed to study alternatives for developing a graduate level textbook detailing the Navy's mathematical models and policies regarding requirements determination [Ref. 3:p. 1]. Rear

Admiral Giordano provided the following guidance regarding the development of the text:

1. Relate to the basics of requirements determination policy.
2. Use appendices to treat complexities of models and math.
3. Focus on Navy policies and procedures.
4. Address both provisioning and replenishment scenarios at wholesale and retail levels.
5. Use Navy case examples and Navy computer listings.
6. Include the impact of the requirements determination process on material budgeting, procurement, material and fund control. [Ref. 3:p. 1]

In September 1982, NAVSUP-04A requested that the Ships Parts Control Center (SPCC), the Aviation Supply Office (ASO), the Navy Fleet Material Support Office (FMSO), the Navy Supply Corps School (NSCS) and the Naval Postgraduate School (NPS) provide comments and recommendations regarding the development of a requirements determination text for use at NPS [Ref. 3:p. 1]. All respondents were thorough in replying and recommended expansion of the proposed coverage of requirements determination to include other topics so the text could be useful to other activities as well. By November 1982, NAVSUP had a broad range of Navy-unique inventory management topics for consideration. Prior to forwarding the recommendations from NPS, the Curricular Officer, Commander R. B. Renner, determined that the scope of the proposed revision was too extensive to include in the existing course, Material Logistics (MN3372). NPS therefore decided to develop a separate course and use the evolving text on requirements determination as the basis for this course [Ref. 4]. NAVSUP disseminated the consolidated list of topics to the working levels of the various activities and scheduled a conference to take place at SPCC in December 1982 to discuss the issues in detail [Ref. 3:p. 1].

At the conference, attendees expressed individual activity interest in the developing text. The two Inventory Control Points (ICPs), SPCC and ASO, indicated an interest in using the text as supporting documentation for their respective ICP Academies. Further, the Navy Supply Corps School (NSCS), located in Athens, Georgia, was considering using the text for a course entitled Career Supply Management (CSM), also under development at the time. Even with separate command self-interest entering the process, the attendees reached a consensus regarding the slate of topics and produced a proposed text outline comprised of ten chapters (Appendix A.1). The range of topics covered a wide spectrum of inventory management subjects. Interestingly, requirements determination was not addressed until Chapter Five.

Shortly after the December 1982 conference, Commander J. H. Perry (NAVSUP-04A) consolidated the comments and prepared a point paper highlighting the assembled recommendations to present to Rear Admiral Giordano. The recommendations were as follows:

1. The graduate level text on requirements determination should be expanded and tailored for use at both ICPs and the Navy Supply Corps School, as well as the Naval Postgraduate School.
2. The maintenance of the text should be a joint ICP responsibility. (The ICPs were requested to formally reply to this tasking).
3. A separate course should be established at NPS.
4. The text should be developed by a contractor with an estimated cost of $100,000.00. The text should be completed by November 1983. [Ref. 3:p. 2]

With additional direction and comment from the Chief of the Supply Corps, NAVSUP-04A refined the proposed procurement document for developing the text and forwarded the request up the NAVSUP chain of command for final approval.

While these efforts were underway, the commanding officer of SPCC expressed concern about the perishable nature of the material being considered for inclusion in the requirements determination text. Additionally, SPCC indicated that the developing text would not supplant existing references for the Mechanicsburg ICP Academy. In a letter detailing SPCC's response to NAVSUP's possible tasking of ICPs to maintain the publication, the commanding officer, Rear Admiral E. M. Kocher wrote,

> I am reluctant to commit SPCC resources to a task force for text maintenance. Periodic revisions should be accomplished by follow-on contract. [Ref. 5:p. 1]

He also stated,

> I see no specific ICP need for such a text. While it will be helpful to our professional logisticians, it will not replace the UICP orientation of the ICP Academy. [Ref. 5:p. 2]

After further consultation with Rear Admiral Giordano, Commodore C. R. Webb, Assistant Commander for Inventory and Systems Integrity (NAVSUP-00X), was charged with ensuring a properly documented Statement of Work (SOW) accompanied the procurement request for the proposed graduate level text. In a memorandum dated 19 January 1983, Commodore Webb forwarded a revised Statement of Work for Rear Admiral Giordano's approval and signature (Appendix A.2). Prior to final approval of the procurement package, additional justification for the use of a contractor was sought. Commodore Webb provided the justification in a memorandum dated 7 February 1983 and identified the necessity to

1. Acquire a clear, well written and organized graduate quality text,
2. Expedite the text development to meet a summer of 1983 deadline,
3. Hold steady NAVSUP's current workload. [Ref. 6:p. 1]

Equipped with this justification, Rear Admiral Giordano approved the Statement of Work and signed the procurement document. The contract was competitively let and awarded to CACI INC., a consulting firm whose staff is comprised of a number of retired Supply Corps Officers who possess significant ICP and stock point experience. Mr. E. Eaton, CACI's project manager for developing the textbook, stated the company's strategy for obtaining the contract was to

Week 10

Current Inventory Management Topics Seminar (4 hours)

-- This week should be devoted to discussion of current Inventory Management topics. Some sources of subjects include:

    GAO, DOD and Navy audit findings
    SPLICE/SPAR development
    NAVSUP systems integrity problem areas
    Alternate inventory management systems

The use of group reports and guest lecturers would certainly be beneficial to facilitate the learning process during this week.

APPENDIX F

SUPPLY SYSTEM OVERVIEW AND BASIC INVENTORY MANAGEMENT CONCEPTS

June 2nd, 1988

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SUPPLY SYSTEM OVERVIEW AND BASIC INVENTORY MANAGEMENT CONCEPTS

Introduction

This text is intended to serve as the Navy's primer for Inventory Management. The United States Navy is a large organization that includes submarines, surface ships, aircraft, missiles, supporting shore activities and approximately 700,000 military and 360,000 civilian personnel. The Navy's mission is to project power and to control the seas to insure the defense of the nation and keep merchant sea lanes open. The supply aspect of this mission consumes 50% to 65% of the Navy budget. Almost 900,000 line items are managed by Navy supply organizations and over $6 billion worth of material is stocked throughout the world. Supply support is a key contributor to the operational readiness of Naval forces. The efficient management of the Navy's material inventories is a crucial element of this supply support.

This chapter will equip the reader with a thorough understanding of the following elements of inventory management:

- The overall organization of the Department of Defense and the Navy supply and material distribution systems.
- The three level structure for maintenance and inventory.
- The basic inventory concepts, terminology and models.
- The important decision variables and measures of effectiveness used in inventory management.

Chapter 1 provides the perspective to understand the more complex aspects of Navy inventory management. Chapter 2 starts with the study of inventory management at the beginning of a major weapons system life cycle: with the provisioning process. Here both the process of integrated logistics support (ILS) and the models used to determine initial spares requirements are thoroughly discussed. Once the inventory management process is initiated via provisioning, Chapter 3 examines the Navy's wholesale supply system for secondary items from the aspect of requirements determination. Chapter 4 discusses inventory management at the retail levels. Finally, Chapter 5 shows the relationship of material budgeting to inventory management. This chapter describes material budgeting at both the inventory control points and the retail levels.

Supply System Overview, Concepts And Organization

To understand the DOD and Navy supply and material distribution systems, one must understand their organizational and functional responsibilities, DOD and Navy policies, some processing systems and procedures, and the people-computer partnership. The following section discusses inventory management from these perspectives while keeping sight of the fact that the purpose of the supply system is more than just to provide items of supply. Its purpose is to keep fleet weapons systems operating.

Supply Management

Supply Management is the segment of military logistics through which direction and control of all phases of supply operations are exercised. The elements of supply operations are:

- **Cataloging** - This entails the collection, storage and publication of all technical information regarding equipment and parts support for the Navy.
- **Identification** - Properly identifying systems, equipment and spare parts as they become Navy property.
- **Standardization** - The effort to procure standardized weapons systems for the Navy without compromising readiness.
- **Requirements determination** - Determining when and how much of each spare part to procure.
- **Procurement** - The act of purchasing material and equipment.
- **Inspection/Quality Control** - Ensuring the accuracy of Navy stock inventories and validating that procured material meets the highest standards for use.
- **Storage** - Ensuring the safe stowage of material prior to use by the customer.
- **Distribution** - The location of Navy material so that it is available for customer use when required.
- **Disposal** - This function provides for the proper removal from the Navy's inventories of an item of stock at the end of its useful service life.
- **Repair Management** - Arranging for the rebuild and restoration of economically repairable material.
- **Transportation** - Proper shipment of material to customers, repair activities, and inventories.
- **War Reserve Planning** - Participating in mobilization planning, industrial readiness planning and item management classification.

For the purpose of this text several of the above items will not be discussed in detail. They do provide some insight into the complexity of the Navy supply mission. The topics of cataloging, identification, standardization, and requirements determination will be addressed in some depth in this chapter.

Basic Inventory Management Terms and Definitions

End Item: An end item is defined as a "final combination of end products, component parts, and/or materials which is ready for its intended use." Examples would be ships, tanks, mobile machine shops and aircraft. End items are also capable of independent use and may be more simple in construction than the examples given above.

Principal Items: Principal items are end items which are specifically designated by the CNO as a principal item and are characterized by the following management and material considerations:

1. Requirements for the item are determined on a planned basis by the cognizant hardware systems command, rather than by the Naval Supply Systems Command.
2. Requirements for the item are based solely on planned end-use allowances and planned reserve/retention requirements.
3. Separate budgets are formulated through material planning studies and principal item stratifications.
4. Procurements are financed exclusively with appropriated or investment funds.
5. Disposal of items is based solely on major or total destruction, intended destructive use, (for example, the Trident missile), or planned retirement.
6. Issues to end-users are strictly limited to approved authorizations from the hardware systems command which manages the principal item.

Examples of principal items include radar, boiler and gun systems.

Secondary Items: Secondary items are those items not classified as principal items and which exhibit the following characteristics:

1. Requirements for the item are determined by the cognizant inventory control point.
2. Requirements for the item are based either on estimated or observed demands, or on non-demand based insurance levels.
3. Budget formulations are based upon standard levels-setting techniques and standard secondary item stratification projections.
4. Procurements are financed either with investment funds or stock funds, as governed by such factors as unit price and recoverability.
5. Disposal decisions are based primarily on normal in-service wear-out or consumption.

Examples of secondary items include gaskets, nuts and bolts and paper products. Basically, secondary items include a majority of consumables, repair parts and repairables.

One final note: The definitions above are subject to interpretation depending on the programs to which they apply.

Consumable Item: This is material which, after issue from stock to the final user, is consumed in use, or which, while having continuing life, becomes incorporated in other property, thus losing its identity when it is dropped from property accountability. Generally, consumable items are not repaired when unfit for further service. The consumable category excludes major components of equipment, such as aircraft engines, ship propeller shafts, and electronic "black boxes". Consumable items are sometimes referred to as expense items. Wholesale level inventory managers treat field level repairables as consumable items because they are repaired below the depot level.

Repairable Item: A repairable is an item of supply that can be made to function by a repair process after it breaks. It is also referred to as an investment item. Repairable items are usually the more expensive parts or components contained in Navy weapons and ships systems. Some examples include gear boxes, circuit boards and electronic "black boxes".

Cognizance Group: A cognizance group indicates the agency or office which exercises supply management over spare parts in all Navy systems. The cognizance group (cog) is indicated by a two digit character and is usually found preceding the material stock number. Additionally, an item's cog indicates what type of material is in that group. For example, the cog identifies whether the item is a consumable or repairable, its material characteristics, and even the funding source for the item. A cognizance group is also a way of grouping like items for administrative and inventory management purposes. The term cognizance group is sometimes called cognizance of material.

Allowance Parts Lists (APLs): An effective supply system must use its knowledge of customers' technical requirements to prepare listings of the repair parts each customer will need to carry locally. In the Navy's supply system, these lists are called Allowance Parts Lists (APLs). An APL is a list of spares or repair parts. An APL is prepared for each shipboard equipment and system. The APLs for a particular ship are combined into a Coordinated Shipboard Allowance List (COSAL) or an Aviation Consolidated Allowance List (AVCAL) for aviation systems. The customer uses the material in the AVCAL and COSAL to maintain their equipment and to obtain information needed to requisition items.

Appropriated Purchases Account: This is the budgetary account in which material procured with appropriated funds is carried until expended by use or otherwise removed from the supply system. Currently, material purchased with this account is mainly limited to complex, costly, principal items.

Navy Stock Fund: This is a revolving type fund used to finance procurement of consumables and most repairables. When received for stock by Navy Stock Fund holders, material is picked up in the Navy Stock Account until sold to users.

Supply System Overview

The current structure of the supply system is best described in terms of its development. Prior to the 1960's, each of the services individually managed all of the material that the individual service required. This resulted in a great deal of duplicated effort in inventory management and maintenance. In the 1960's, DOD began to emphasize consolidation of inventory management functions. The first step was to remove from the servicesthe wholesale supply management responsibility for those consumable items that were also managed by the General Services Administration (GSA) and consolidate their management at GSA. The services now had to "buy" these items from GSA and to depend upon GSA to properly manage the inventories of these general consumable items. Some examples of GSA managed items include office products and furniture.

The next step in the process of consolidation was the creation of the Defense Logistics Agency. DLA was given the responsibility for managing those consumable items which were peculiar to the military but which were used by more than one service. An additional criterion for DLA management of an item was that the material had to be relatively easy to manage, that is, of stable design and easy to procure. Finally, the relatively few consumable items left under the control of the services were further consolidated so that any item which was used by two or more of the services would be managed by only one service.

These changes represent a supply management technique called integrated management. Integrated management is a technique through which responsibility for the wholesale level management of an item of supply is assigned to a single government agency or military service inventory manager for the purpose of supporting the requirements of all military services. For example, the Defense Personnel Support Center (DPSC) centrally procures or manufactures and manages the clothing and uniform needs of the various services.

The objective of this integrated management policy is to eliminate the duplication of item management activities. There will be only one inventory control point for any item used in the Department of Defense. In general, the military services should manage the weapons systems, including ammunition, principal items of equipment, depot level repairables and items of a developmental nature, regardless of the number of user services. Items which are repaired below depot level, consumables, and repair parts should be considered for integrated management.

Stock Coordination

Stock coordination ties in with integrated management policy. Stock coordination is the administrative process by which an item, group or category of material is identified and assigned to one inventory manager. The purpose of this process is to sustain the proper application of item management on a continuous basis. The process begins with the approval for the establishment of a major weapon or weapon support system and continues until the weapon or system is taken out of operation. From the time that the initial determination and assignment of material cognizance group is made, the characteristics of the item, its parent equipment, and the environment of operations will be continually reviewed to insure that all items will be managed at the most logical and appropriate level. Stock coordination is required on a Navy-wide basis to ensure that the interrelated actions of hardware systems commands and program managers are mutually responsive and integrated. The key hardware systems commands (HSCs) involved with this stock coordination effort are the Naval Sea Systems (NAVSEA), Naval Air Systems (NAVAIR), Naval Facilities Engineering (NAVFAC), Naval Space and Warfare Systems (SPAWARS), and Naval Supply Systems (NAVSUP) commands. Stock coordination reviews can lead to inventory management transfers from the systems commands to the service inventory control points (ICPs) to DLA management. Infrequently, items will migrate in the opposite direction.

During past years there have been massive changes in inventory management through stock coordination actions. The impacts of these changes have affected the end strength of our ICPs, the relative sizes of Navy and DLA stock funds and other areas. Figure 1 illustrates the impact of these changes. The bulleted items under the pie charts in the figure describe some of the key historical stock coordination actions.

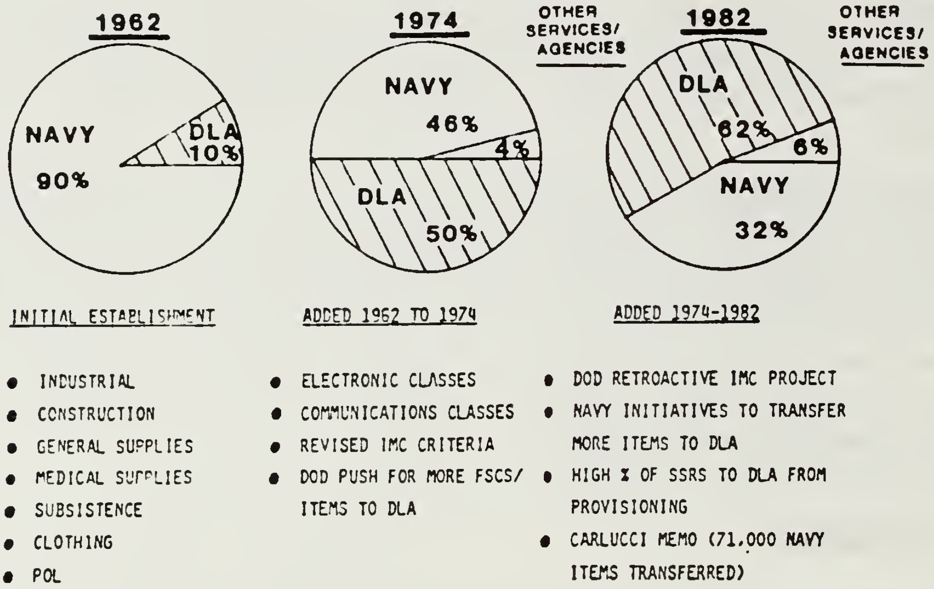


Figure 1. Changes in Management of Items: Source - Career Supply Management Course Technical Notes, 1985.

Standardization

Material standardization is a DOD policy and goal. The purposes of material standardization are to improve the efficiency and effectiveness of logistic support and operational readiness; and to conserve money, manpower, time, production facilities and natural resources without compromising the suitability of the material. All of the elements of Integrated Logistic Support (ILS) tend to be favorably affected by standardization and unfavorably affected by lack of standardization. The hardware systems commands are charged with the responsibility for the development of detailed plans, schedules, and procedures for implementation of the Defense Standardization Program within the Department of the Navy. DOD instruction 4120.3 provides the objectives of the standardization program as follows:

1. Adoption of the minimum number of sizes, kinds or types of items and services essential to military operations.
2. Achievement of the optimum degree of interchangeability of the component parts used in these items.

3. Development of standard terminology, codes and drawing practices to achieve common understanding and clear interpretation of the description of items and practices.
4. Preparation of engineering and purchase documents to ensure the design, purchase and delivery of items consistent with the technical requirements of the item and the scope and purpose of the standardization program.
5. Enhance reliability and maintainability of military equipment and supplies by the selection of material which has been evaluated in accordance with Government specifications and standards.

Components equipments that require spare parts support will be acquired in a manner which is oriented toward replacement in kind (same make and model) so as to enhance standardization and obviate the preparation of new allowance lists or adjustment of repair parts distribution. The applicable logistic support costs, or total cost to the Government, will be considered before acquiring other than a make or model used in previous Naval systems, listed on existing allowance lists, and supported by the supply system.

Historically, Navy attempts at standardization have not met with great success particularly in the hull, mechanical and electrical (HM&E) areas. Frequently, the procurement regulations make standardization more difficult to achieve. Additionally, the way we have procured ships with contractor (shipbuilder) furnished HM&E equipment has led to lack of standardization. The best solution for this problem is to write ship contracts with incentives for equipment and parts standardization. NAVMAT instruction 4120.97 provides these types of guidelines for supporting standardization practices in Navy procurements.

The impact that use or lack of standardization can have on supply, maintenance, technical manuals and other ILS elements is tremendous. Figure 2 illustrates how previous shortfalls in equipment standardization have led to enormous deficiencies in parts commonality.

COMMON SHIPS	NUMBER OF COMPONENTS	% OF TOTAL	CUMULATIVE PERCENTAGE
1	40,331	25.76	25.76
2	25,167	16.08	41.84
3	15,508	9.90	51.74
4	10,463	6.68	58.42
5	8,763	5.60	64.02
6	6,232	3.98	68.00
7	4,411	2.82	70.82
8	3,757	2.40	73.22
9	3,077	1.97	75.19
10-19	16,397	10.47	85.66
20-49	14,178	9.06	94.72
50-99	4,644	2.97	97.69
100+	3,617	2.31	100.00
TOTAL	156,545	100.00	

Figure 2. Commonality of HM&E APLs in the Fleet: Source - Career Supply Management Course Technical Notes, 1985.

Cataloging

Cataloging (assigning National Stock Numbers), for most people, is not an exciting subject yet it is one of the most critical areas affecting supply support. The goals of cataloging are to increase military effectiveness, aid the national economy, and promote greater efficiency and economy in material logistics operations. NAVSUP has the responsibility to develop policy, detailed plans, schedules and procedures for implementation of the Federal Catalog Program with respect to Navy material.

The objectives of the Federal Catalog Program as stated in the Defense Logistics Service Center publication entitled, *Overview of the Federal Catalog System*, are:

1. To develop, establish and maintain a single uniform catalog system, and thereafter use this system as an effective tool of management in all material logistics functions.
2. To provide a common identification language, eliminate different identifications of like items, aid in standardization, facilitate inter- and intra-departmental logistic support, assist industrial mobilization, prevent unnecessary new items from entering the supply system and strengthen government-industry relationships.

There are three basic ingredients to a cataloging system:

- Stock Number
- Classification
- Publication Communication

Establishment of a unique identification number (the National Stock Number (NSN)) for an item of supply is the most important element of a cataloging system. The assignment of an NSN converts the various part numbers assigned by civilian defense contractors to a common numbering system for use by DOD. It is through the assignment of National Stock Numbers that the DOD and Navy are able to carry out many of their supply policies such as parts standardization, interchangeability, integrated management and others. The use of uniform commodity groupings to systematically categorize related items of supply is the key to classification (eg. commodity group 5130 - Power Driven Hand Tools). Finally, the publication and communication of the cataloged data is necessary to provide rules and reference materials and to display the data on file.

The Defense Logistics Services Center (DLSC), in Battle Creek, Michigan, is the keeper of all cataloging data. DLSC assigns all NSNs, maintains a data bank of information on all NSNs through the Defense Integrated Data System (DIDS) and provides logistics services from the DIDS to all military activities, Federal civil agencies, participating foreign governments and private industry. The basic steps in the cataloging process are:

1. Select maintenance significant parts as identified by the manufacturer.
2. Provisioning packages for new equipment are screened to find parts which already have stock numbers assigned.
3. Assignment of Item Management Codes (IMCs). These codes determine whether the items will be Navy or DLA managed. If the item passes through all the filter screens illustrated in Figure 3 it will be managed by DLA.
4. Assign stock numbers as required.
5. Supply Support Requests (SSRs) for part numbered items which will be managed by DLA are forwarded by the using service to the proper DLA inventory manager to obtain supply support. A SSR for items with stock numbers already assigned is forwarded to alert him of Navy requirements for new and follow-on provisioning.

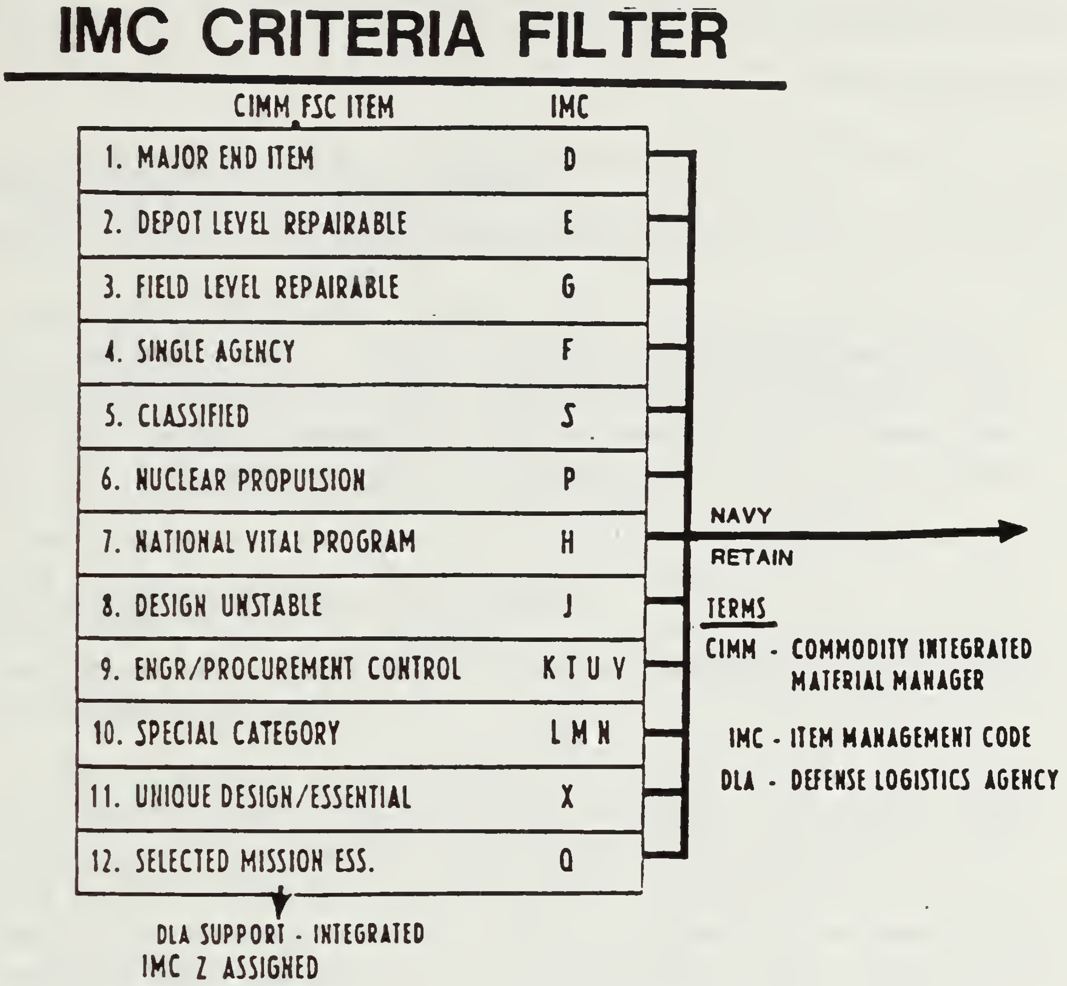

IMC CRITERIA FILTER
CIMM FSC ITEM
IMC
1. MAJOR END ITEM
D
2. DEPOT LEVEL REPAIRABLE
E
3. FIELD LEVEL REPAIRABLE
G
4. SINGLE AGENCY
F
5. CLASSIFIED
S
6. NUCLEAR PROPULSION
P
7. NATIONAL VITAL PROGRAM
H
8. DESIGN UNSTABLE
J
9. ENGR/PROCUREMENT CONTROL
K T U V
10. SPECIAL CATEGORY
L M N
11. UNIQUE DESIGN/ESSENTIAL
X
12. SELECTED MISSION ESS.
Q
NAVY
RETAIN
TERMS
CIMM - COMMODITY INTEGRATED MATERIAL MANAGER
IMC - ITEM MANAGEMENT CODE
DLA - DEFENSE LOGISTICS AGENCY
DLA SUPPORT - INTEGRATED
IMC Z ASSIGNED

Figure 3. IMC Criteria Filter: Source - Career Supply Management Course Technical Notes, 1985.

Currently, about 80 per cent of all newly provisioned items are being assigned to DLA for management. The majority of the items being retained for Navy management are repairables. This statistic is a clear indication of the current policy to give as many of the consumable items as possible to DLA.

Levels of Maintenance and Inventory

Maintenance and inventory functions are closely related and must be clearly understood before describing inventory theory and management approaches.

Maintenance Levels

The three general levels of maintenance used in the Navy are: organizational, intermediate and depot. The Navy may use their own internal capabilities for all three levels of maintenance or may have contractors perform this work. Organic Navy capabilities typically consist of:

- **Organizational Maintenance** - Shipboard, squadron, station and mobile technical units. Maintenance at this level is normally limited to periodic checks of equipment performance, visual inspections, cleaning of equipment, some servicing, external adjustments, and the removal and replacement of some components.
- **Intermediate Maintenance** - Aviation Intermediate Maintenance Departments for Marine Air Groups or Naval Air Stations, tenders and repair ships for ships and submarines, and Shore Intermediate Maintenance Activities for non-aviation fleet units. At this level, end items may be repaired by the removal and replacement of major modules, assemblies, or piece parts. Scheduled maintenance requiring equipment disassembly may also be accomplished.
- **Depot Maintenance** - Naval Air Depots (NADEP), Naval Shipyards, weapons stations, weapon centers and Naval Ordnance Stations. This is the highest, most complex level of maintenance. The depot level of maintenance includes the complete overhauling, rebuilding and calibration of equipment as well as the performance of highly complex maintenance actions. Of all the levels of maintenance, this level makes the greatest use of contractor services.

Inventory Levels

Inventories are maintained to support two functions: peacetime operations and providing an adequate supply of war reserve material. The three levels of peacetime inventory are called wholesale, retail intermediate and retail consumer. Peacetime Operating Stock (POS) as defined by DOD Directive 4140.1 is simply material designated to meet peacetime force material requirements. The levels of inventory are defined as follows:

- **Wholesale Inventory** - Material over which the wholesale inventory manager has visibility and control at the national level. The management of Wholesale inventories in the Navy is discussed in Chapter 2 (Provisioning) and Chapter 3 (Requirements Determination).
- **Retail Intermediate Inventory** - A level of inventory between the consumer and wholesale levels to support a given geographic area, including area resupply and the three levels of maintenance. The management of the retail intermediate level of stock is discussed in Chapter 4.

- **Retail Consumer Inventory** - This level of inventory is material held strictly for a specific unit's own use. Initial provisioning for specific units is described in Chapter 2. The replenishment of these stocks is described in Chapter 4.

General Characteristics of Wholesale Inventories

1. Inventory levels are computed based on worldwide demand data.
2. Material is available for unrestricted use by the wholesale item manager.
3. The wholesale item manager knows (theoretically) where all stock is located.
4. Material is under the accountability of the designated inventory control point.
5. Material is "pushed" by the wholesale level to the retail intermediate level.

General Characteristics of Intermediate Inventories

1. Requirements are computed based on historical demands arising in a geographical area or from designated activities.
2. Material is "pulled" from the wholesale system. (This is presently true only for material which is managed at the wholesale level by DLA, GSA or another service.)
3. Each transaction concerning an item is reported to the wholesale level.
4. The stock is not usually available to satisfy demands outside the stock point's geographical area of support.

General Characteristics of Consumer Inventories

1. The purpose is to provide direct support associated with readiness goals.
2. Computations are made to set up inventories via an allowance list. These allowance lists are established to meet operational readiness goals based on specific unit endurance goals.
3. Material is issued directly to the maintenance technician.
4. Inventories are not used to resupply another level of inventory.
5. The material is used by the activity in performing its function.

War Reserve Material

In actuality, a fourth level of inventory exists. In addition to peacetime operating stock (POS) levels, the Services are required to determine and maintain war reserve requirements as an essential part of a credible conventional deterrent. The following definitions apply to war reserve material:

- **War Material Requirement (WMR)** - The total material needed to sustain mobilization operations during the period prescribed by DOD for war material planning purposes.
- **War Reserve Material Requirement (WRMR)** - That portion of the WMR that must be physically on-hand on D-day. A portion of the WMR can be purchased from American industry so quickly that it does not have to be stocked in military inventories.
- **Prepositioned War Reserve Material Requirement (PWRMR)** - That portion of the WRMR that must be reserved and actually positioned at or near the point of planned use or issue to support operations until replenishment can be provided.

The determination of war reserve requirements is discussed in Chapter 5. DOD Directive 4140.2 and DOD Instruction 4140.47 give specific policy and procedures governing war reserve requirements determination.

Defense Logistics Agency (DLA) Organization

Scope

Not only does DLA manage 54 percent of all stock numbered items for all DOD, but of the 2,138,000 NSN's used throughout the Navy, 66 percent of those items are presently procured and managed at the wholesale level by DLA. Only 27 percent are Navy managed, while 7 percent are managed by GSA or another service. Figure 4 graphically illustrates the key role DLA plays in inventory management by showing the percentages and quantities of stock numbered items managed by DLA and the individual services.

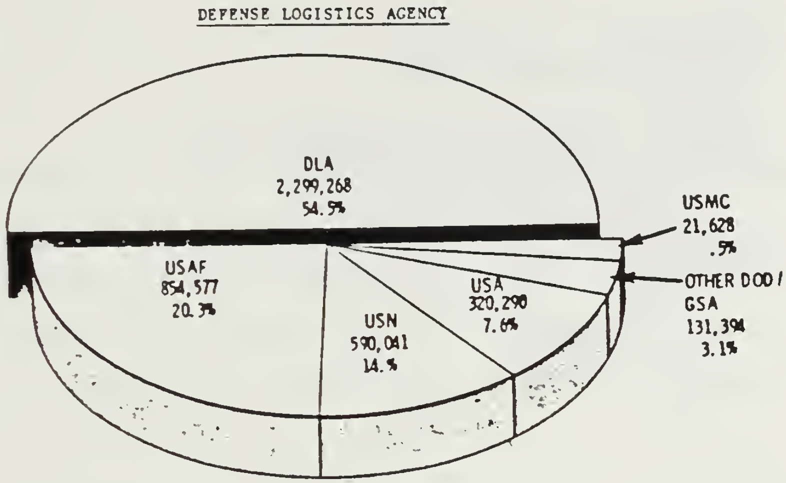


Figure 4. National Stock Number Management: Source - Career Supply Management Course Technical Notes, 1985.

DLA Mission

The mission of DLA is to enhance the material readiness of the Armed Services and contribute to the operating efficiency of the Department of Defense by providing effective and economical support for assigned:

- Items of supply
- Logistics services
- Contract administrative services

DLA functions are executed through various supply centers, depots, contract administration services regions and service centers throughout the country. Figure 5 shows the basic DLA organization.

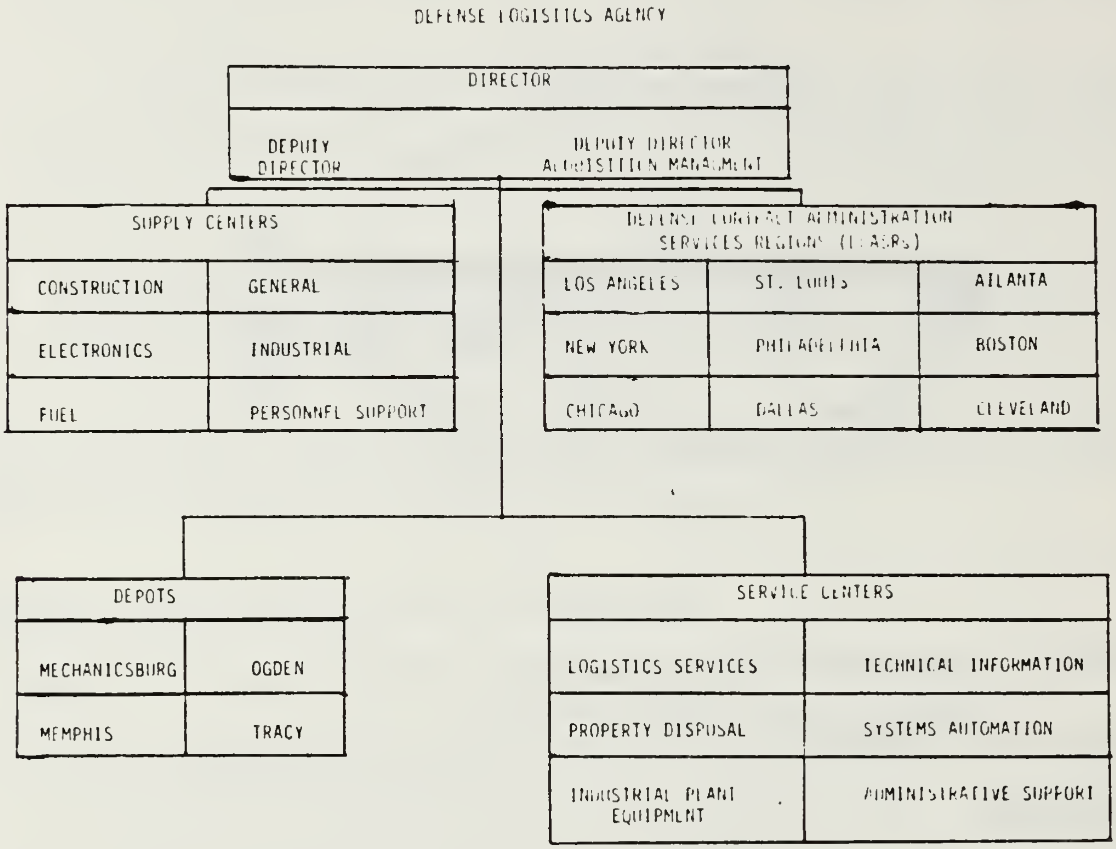

DEFENSE LOGISTICS AGENCY
DIRECTOR
DEPUTY DIRECTOR
DEPUTY DIRECTOR ACQUISITION MANAGEMENT
SUPPLY CENTERS
CONSTRUCTION
GENERAL
ELECTRONICS
INDUSTRIAL
FUEL
PERSONNEL SUPPORT
DEFENSE CONTRACT ADMINISTRATION SERVICES REGIONS (DCASRs)
LOS ANGELES
ST. LOUIS
ATLANTA
NEW YORK
PHILADELPHIA
BOSTON
CHICAGO
DALLAS
CLEVELAND
DEPOTS
MECHANICSBURG
OGDEN
MEMPHIS
TRACY
SERVICE CENTERS
LOGISTICS SERVICES
TECHNICAL INFORMATION
PROPERTY DISPOSAL
SYSTEMS AUTOMATION
INDUSTRIAL PLANT EQUIPMENT
ADMINISTRATIVE SUPPORT

Figure 5. **Defense Logistics Agency Organization:** Source - Career Supply Management Course Technical Notes, 1985.

DLA Supply Centers

The six DLA Supply Centers shown in Figure 6 are more analogous to the Navy inventory control points than to a Naval supply center. The DLA supply centers are primarily wholesale level organizations.

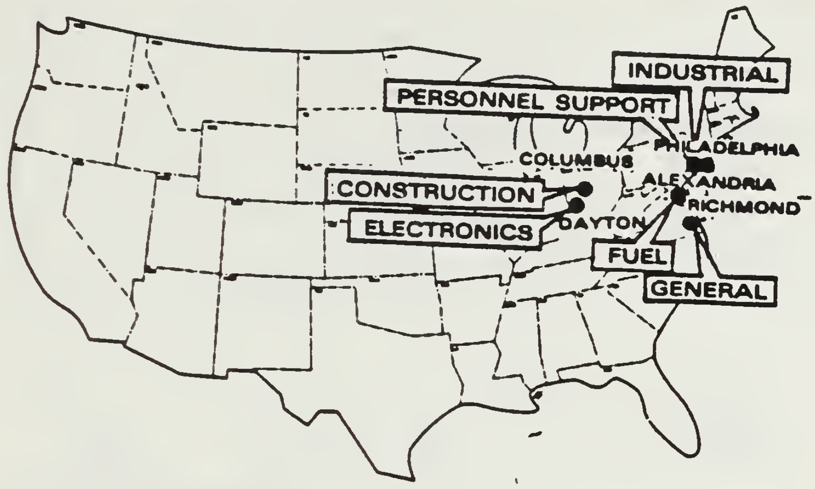

INDUSTRIAL
PERSONNEL SUPPORT
PHILADELPHIA
COLUMBUS
ALEXANDRIA
CONSTRUCTION
RICHMOND
ELECTRONICS
DAYTON
FUEL
GENERAL

Figure 6. DLA Supply Centers: Source - Career Supply Management Course Technical Notes, 1985.

DLA supply centers perform the following functions:

- Computing wholesale requirements for assigned items.
- Procuring items for stock and direct delivery to customers.
- Processing requisitions and maintain accountibility records.
- Performing value engineering and item standardization studies.
- Developing acquisition data packages.
- Developing item identification and catalog management data.
- Reviewing inactive items.
- Expediting Fleet and other service requirements.

During FY86 the DLA supply centers initiated 1.5 million contractual actions and obligated 16 billion dollars in order to purchase required DOD material. This is well over twice the combined dollar value of the Navy inventory control point (ICP) business. The commodities and items managed by DLA tend to be "easier" to manage than do most Navy managed items. However, the Navy ICPs are rapidly turning over to DLA all but a few categories of consumable items. In the future, this will mean that DLA will have an even more direct affect upon fleet support.

DLA Distribution System

The DLA distribution centers received over 7.5 million requisitions during FY86. Major DLA distribution points are at Tracy CA, Ogden UT, Columbus OH, Mechanicsburg PA, Memphis TN and Richmond VA. Naval supply centers are also major specialized support points (SSPs) which means that they stock wholesale DLA material. NSC Norfolk, for example, will issue DLA material worldwide to Army and Air Force commands as well as to Navy requisitioners. Figure 7 displays the DLA distribution system.

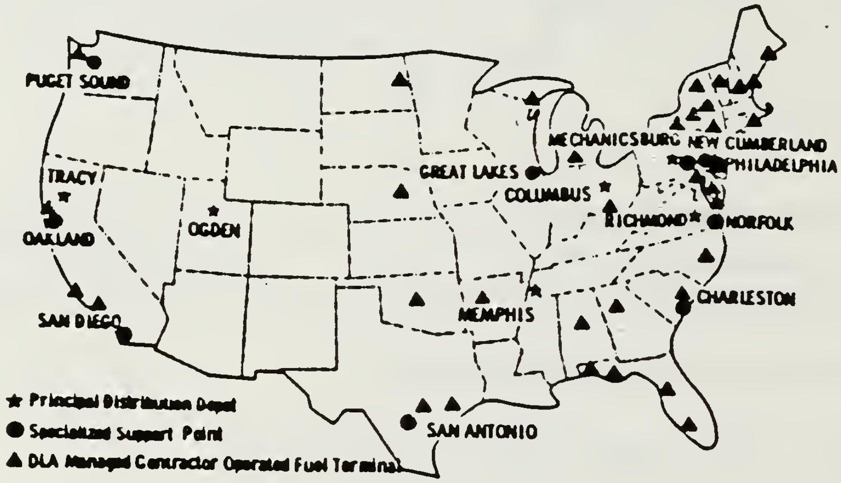

PUGET SOUND
TRACY
OAKLAND
OGDEN
SAN DIEGO
GREAT LAKES
COLUMBUS
MECHANICSBURG
NEW CUMBERLAND
PHILADELPHIA
RICHMOND
NORFOLK
CHARLESTON
MEMPHIS
SAN ANTONIO
★ Principal Distribution Depot
● Specialized Support Point
▲ DLA Managed Contractor Operated Fuel Terminal

Figure 7. DLA Distribution System: Source - Career Supply Management Course Technical Notes, 1985.

DLA Service Centers

In addition to inventory management and material distribution, DLA performs various technical and logistics services for all the services as an agent of the Department of Defense. These services include maintaining the Federal catalog system, managing the excess defense property disposal program, managing industrial plant equipment and maintaining DOD scientific and technical information. Figure 8 shows these services and their locations.

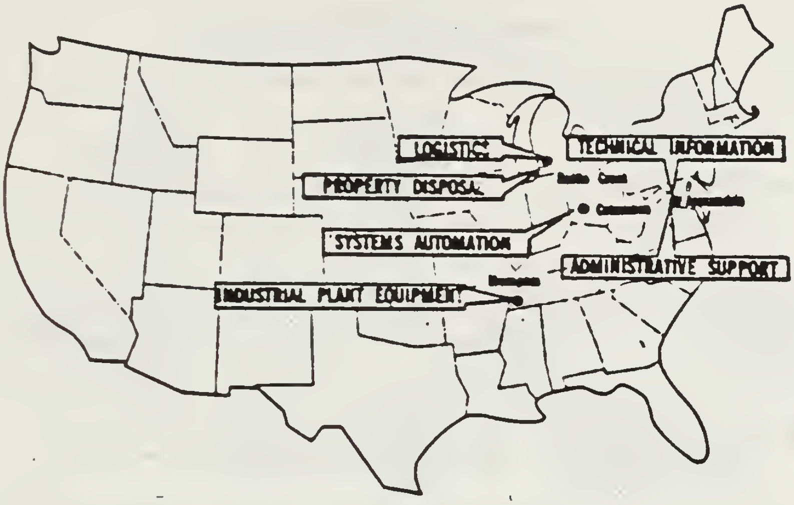
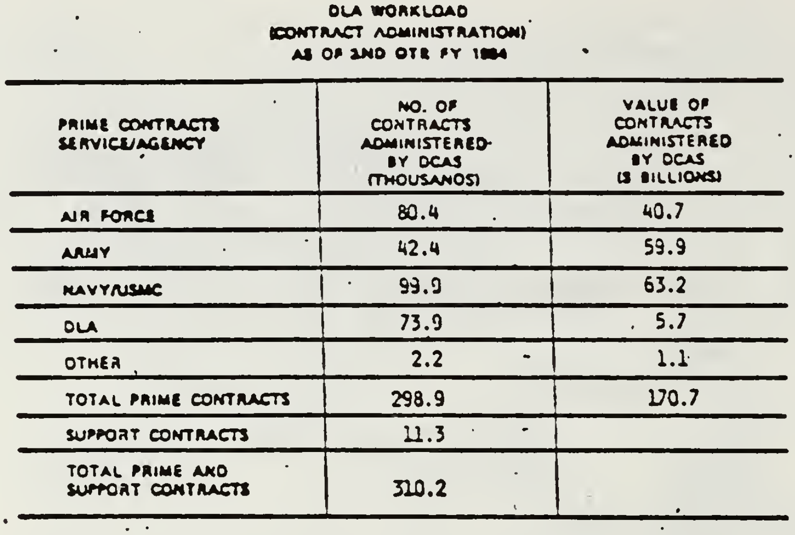

LOGISTICS
TECHNICAL INFORMATION
PROPERTY DISPOSAL
SYSTEMS AUTOMATION
ADMINISTRATIVE SUPPORT
INDUSTRIAL PLANT EQUIPMENT

Figure 8. **DLA Service Centers:** Source - Career Supply Management Course Technical Notes, 1985.

DLA Contract Administration

Contract administration services are another major DLA function. To perform its contract administration functions, DLA splits the country into nine geographic regions. A Defense Contract Administration Region (DCASR) and its field commands serve the region. DLA assumes responsibility for the administration of a majority of DOD contracts following initial procurement action by the services. Figure 9 demonstrates the scope of this important function.



DLA WORKLOAD
(CONTRACT ADMINISTRATION)
AS OF 2ND QTR FY 1984

PRIME CONTRACTS SERVICE/AGENCY	NO. OF CONTRACTS ADMINISTERED BY DCAS (THOUSANDS)	VALUE OF CONTRACTS ADMINISTERED BY DCAS ($ BILLIONS)
AIR FORCE	80.4	40.7
ARMY	42.4	59.9
NAVY/USMC	99.9	63.2
DLA	73.9	5.7
OTHER	2.2	1.1
TOTAL PRIME CONTRACTS	298.9	170.7
SUPPORT CONTRACTS	11.3	
TOTAL PRIME AND SUPPORT CONTRACTS	310.2	

Figure 9. DLA Contract Administration Workload: Source - Career Supply Management Course Technical Notes, 1985.

Navy Supply System Organization

To understand inventory management in the Navy it is necessary to be thoroughly familiar with the organization of the Navy's supply system. Basic supply support is derived from several sources: the internal Navy supply system: DLA: other military services: and the GSA. Figure 10 illustrates this organization. The following section on the the Navy's supply system identifies and provides a brief summary of the key organizations.

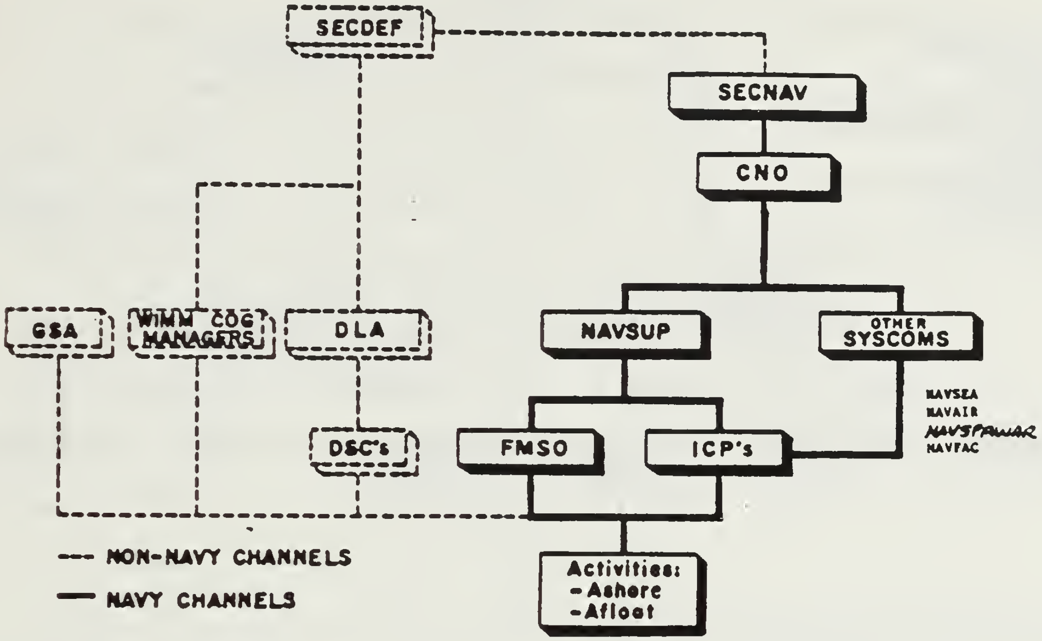

SECDEF
SECNAV
CNO
GSA
WIMM COG MANAGERS
DLA
NAVSUP
OTHER SYSCOMS
NAVSEA
NAVAIR
NAVSPAWAR
NAVFAC
DSC's
FMSO
ICP's
Activities:
-Ashore
-Afloat
--- NON-NAVY CHANNELS
— NAVY CHANNELS

Figure 10. The Navy Organization for Supply: Source - FMSO Basic Inventory Manager's Manual.

Naval Supply Systems Command (NAVSUP)

NAVSUP has a number of broad management responsibilities. Some of the major responsibilities include:

- Inventory management of all parts in a principal end item from the time of the Navy support date in the life cycle, to final disposal of the last unit.
- Central weapons configuration data.
- Program support for DLA and other non-Navy managed items.
- Automated data processing systems.

The Commander of the Naval Supply Systems Command, assisted by his headquarters staff is responsible for policy direction and guidance in these areas. The major commands which execute the Navy supply management functions are the inventory control points (Ships Parts Control Center and Aviation Supply Office), 43 retail intermediate stock points, the Fleet Material Support Office and the Publications and Forms Center. The NAVSUP organization is shown in Figure 11.

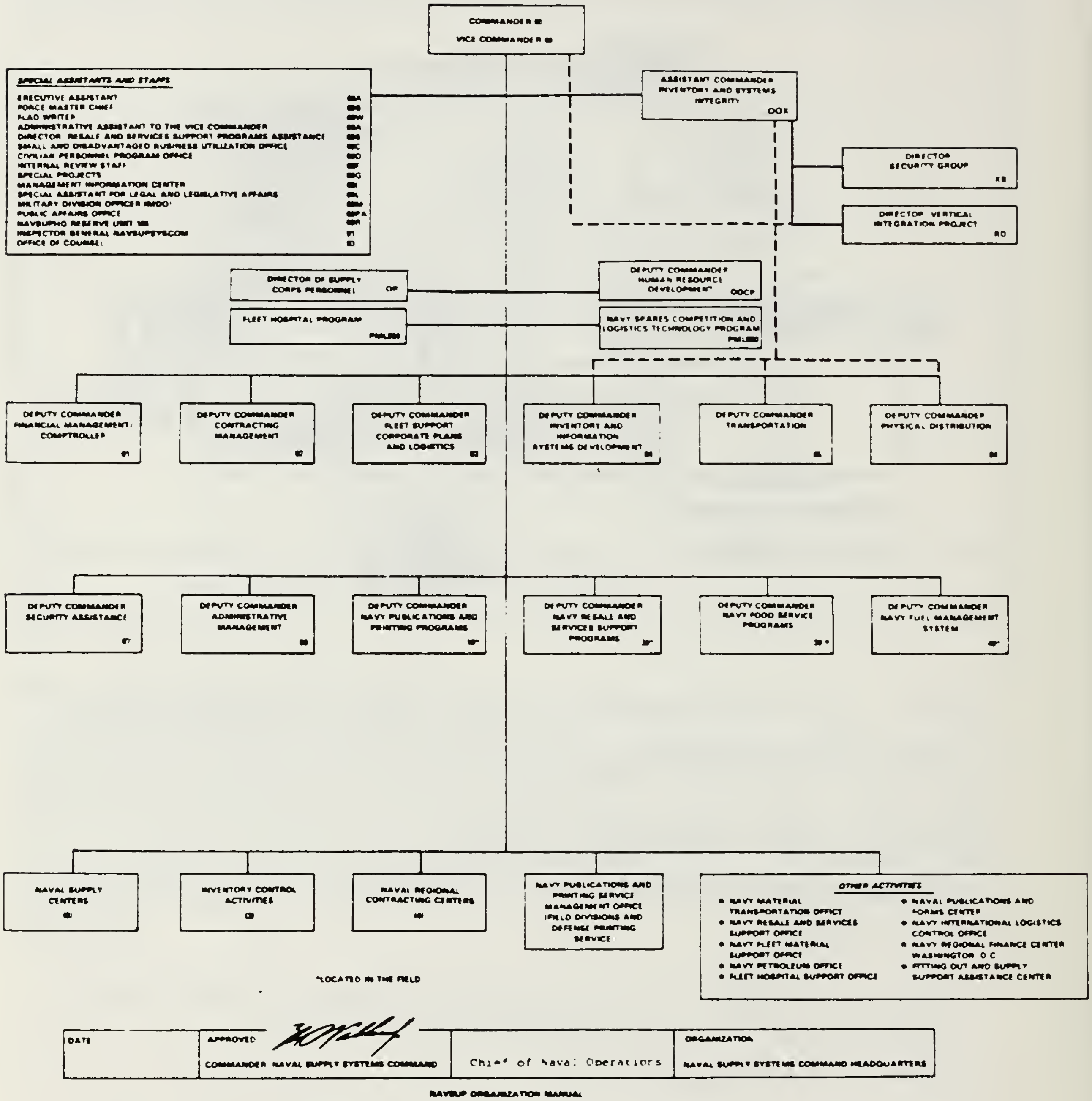

COMMANDER
VICE COMMANDER
SPECIAL ASSISTANTS AND STAFFS
EXECUTIVE ASSISTANT
FORCE MASTER CHIEF
FLAG WRITER
ADMINISTRATIVE ASSISTANT TO THE VICE COMMANDER
DIRECTOR RESALE AND SERVICES SUPPORT PROGRAMS ASSISTANCE
SMALL AND DISADVANTAGED BUSINESS UTILIZATION OFFICE
CIVILIAN PERSONNEL PROGRAM OFFICE
INTERNAL REVIEW STAFF
SPECIAL PROJECTS
MANAGEMENT INFORMATION CENTER
SPECIAL ASSISTANT FOR LEGAL AND LEGISLATIVE AFFAIRS
MILITARY DIVISION OFFICER (MDO)
PUBLIC AFFAIRS OFFICE
NAVSUPHQ RESERVE UNIT
INSPECTOR GENERAL NAVSUPSYSCOM
OFFICE OF COUNSEL
ASSISTANT COMMANDER INVENTORY AND SYSTEMS INTEGRITY OOX
DIRECTOR SECURITY GROUP
DIRECTOR VERTICAL INTEGRATION PROJECT RO
DIRECTOR OF SUPPLY CORPS PERSONNEL OP
DEPUTY COMMANDER HUMAN RESOURCE DEVELOPMENT OOCP
FLEET HOSPITAL PROGRAM
NAVY SPARES COMPETITION AND LOGISTICS TECHNOLOGY PROGRAM
DEPUTY COMMANDER FINANCIAL MANAGEMENT/COMPTROLLER 01
DEPUTY COMMANDER CONTRACTING MANAGEMENT 02
DEPUTY COMMANDER FLEET SUPPORT CORPORATE PLANS AND LOGISTICS 03
DEPUTY COMMANDER INVENTORY AND INFORMATION SYSTEMS DEVELOPMENT
DEPUTY COMMANDER TRANSPORTATION
DEPUTY COMMANDER PHYSICAL DISTRIBUTION
DEPUTY COMMANDER SECURITY ASSISTANCE
DEPUTY COMMANDER ADMINISTRATIVE MANAGEMENT
DEPUTY COMMANDER NAVY PUBLICATIONS AND PRINTING PROGRAMS
DEPUTY COMMANDER NAVY RESALE AND SERVICES SUPPORT PROGRAMS
DEPUTY COMMANDER NAVY FOOD SERVICE PROGRAMS
DEPUTY COMMANDER NAVY FUEL MANAGEMENT SYSTEM
NAVAL SUPPLY CENTERS
INVENTORY CONTROL ACTIVITIES
NAVAL REGIONAL CONTRACTING CENTERS
NAVY PUBLICATIONS AND PRINTING SERVICE MANAGEMENT OFFICE (FIELD DIVISIONS AND DEFENSE PRINTING SERVICE)
OTHER ACTIVITIES
• NAVY MATERIAL TRANSPORTATION OFFICE
• NAVY RESALE AND SERVICES SUPPORT OFFICE
• NAVY FLEET MATERIAL SUPPORT OFFICE
• NAVY PETROLEUM OFFICE
• FLEET HOSPITAL SUPPORT OFFICE
• NAVAL PUBLICATIONS AND FORMS CENTER
• NAVY INTERNATIONAL LOGISTICS CONTROL OFFICE
• NAVY REGIONAL FINANCE CENTER WASHINGTON D C
• FITTING OUT AND SUPPLY SUPPORT ASSISTANCE CENTER
*LOCATED IN THE FIELD
DATE
APPROVED
COMMANDER NAVAL SUPPLY SYSTEMS COMMAND
Chief of Naval Operations
ORGANIZATION
NAVAL SUPPLY SYSTEMS COMMAND HEADQUARTERS
NAVSUP ORGANIZATION MANUAL

Figure 11. Naval Supply Systems Command Organization: Source - NAVSUP Organization Manual, 1987.

Navy Supply Management Organizations

The key commands in the Navy's supply management organization along with their primary responsibilities are listed below:

- Inventory Control Points (ICPs)
    - ICPs control 480,000 line items at SPCC and 370,000 at ASO.
    - ICPs manage weapons system configuration.
- Fleet Material Support Office (FMSO)
    - FMSO finances 1,500,000 line items.
    - FMSO maintains 10,000 computer programs.
- Navy Stock Points (43 located throughout the world)
    - Stock points collectively stock 2.5 million line items.
    - Stock points have a collective inventory value of $12 billion.
- Navy Publications and Forms Center (NPFC)
    - NPFC controls 250,000 line items.
    - NPFC maintains a central warehouse for publications and forms and is developing a "print on demand" capability.
    - NPFC stores and issues Navy required publications and forms.

Functions of an Inventory Control Point (ICP)

Most ICP functions can be categorized into two broad areas: program support and supply support. Program support functions relate to the total support of weapons systems. For instance, a question about general support of the F/A-18 aircraft will be answered by a weapons systems (program support) manager who will collect and analyze information from the ASO and DLA item managers who are responsible for managing the components and parts of the F/A-18. Supply support functions deal with items managed by the ICP. Supply support involves item management, e.g., requirements determination, material distribution and procurement of replenishment stock, repairables management, disposal, etc. Program support managers have more external dealings than supply support managers with the hardware systems commands, engineering activities, and other weapons systems ILS managers. Supply support functions tend to deal with supply centers, material requisitions at all levels, depot level component repair activities and program managers in the ICPs (particularly their own ICP) who are either looking for information or providing information about an item of equipment.

The following lists distinguish the differences in the roles of the ICPs for program and supply support:

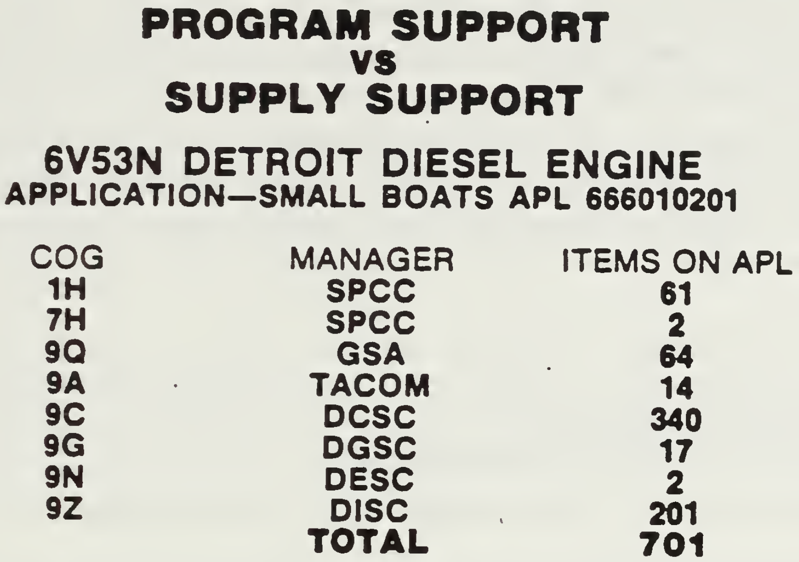
ICP Program Support Functions

- Life cycle weapons support which entails management of most of the logistics elements of the system
- Provisioning
- Allowance and load lists determination
- Maintaining configuration files
- Writing supply support requests (SSRs)
- Determining replacement or failure rates for spare parts
- Analysis of weapons system performance

ICP Supply Support Functions

- Integrated inventory management
- Requirements determination
- Material distribution and issue
- Material procurement
- Repairables management
- Budget development for parts support

Figure 12 helps illustrate the difference in program support versus supply support ICPs. In this example, SPCC is the central point of contact for all support problems for this diesel boat engine. If a type commander such as SURFLANT is unhappy with diesel engine support, he turns to SPCC as the Program Support ICP (PSICP) to fix the problem. SPCC, as the supply support ICP manages only 63 of the 701 items but, as the program support ICP will, as required, deal with all the other cognizant inventory managers, the engineers and maintenance activities, adjust allowance and load lists, or take whatever actions are necessary to improve supply support. The figure illustrates how a wide variety of ICPs may exercise management control over the various parts of a system. For example, the Army's Tank and Automotive Command (TACOM) controls 14 items of supply for the diesel engines.



PROGRAM SUPPORT
VS
SUPPLY SUPPORT

6V53N DETROIT DIESEL ENGINE
APPLICATION—SMALL BOATS APL 666010201

COG	MANAGER	ITEMS ON APL
1H	SPCC	61
7H	SPCC	2
9Q	GSA	64
9A	TACOM	14
9C	DCSC	340
9G	DGSC	17
9N	DESC	2
9Z	DISC	201
	TOTAL	**701**

Figure 12. Program versus Supply Support: Source - SPCC Command Business Presentation.

The ICPs have always had a program support responsibility. However, in recent years, weapons systems support responsibility has become more visible, more critical and more recognized at both the PSICPs.

Functions of a Stock Point

The main mission of a stock point is the physical distribution of material. Timeliness and accountability are two key performance indicators for this mission. The main functions include:

- Receiving material
- Stowing material
- Issuing and shipping material
- Billing the customer for material
- Budgeting and accounting for funds to procure material
- Reporting receipts and issues to each item's ICP

Functions of the Fleet Material Support Office

The Navy Fleet Material Support Office, more commonly referred to as FMSO, is a unique command within the Navy supply system. FMSO is widely known throughout the supply system but probably not fully understood in terms of its complete range of mission responsibilities. This is due to the diverse range of FMSO's activities and to the largely supporting nature of those activities. FMSO's mission areas focus on the following five functions:

- Central design agency (CDA) for the computer software used at the ICPS and stock points.
- Retail Navy stock fund (NSF) management.
- Operations analysis, i.e. design of supply models and procedures
- Supply operations support.
- International logistics.

Central Design Agency (CDA): As the Navy supply system's central design agency, FMSO is responsible for providing the computer network of the supply system with the computer programs necessary to allow the hardware to operate. The CDA mission of FMSO is its largest mission, with about 80 per cent of its work force of 1300 engaged in CDA related activities. A significant portion of that effort is deals with four uniform (standardized) automated data processing (ADP) systems; the uniform ADP system for inventory control points (UICP), the uniform ADP system for large stock points (UADPS-SP), the Level II/III system for small aviation stock points and the disk oriented supply system (DOSS) for the smallest stock points.

As their names suggest, the first two of these four systems are used by the ICPs and stock points to perform their respective supply, accounting, and financial management functions. The Level II/III systems are in use at several of the Navy's smaller aviation support facilities for the purposes of supply, financial, and resources management. The last of the four uniform systems, DOSS, is used by the smaller stock points and is a scaled down version of the UADPS-SP employed by the larger stock points.

The headquarters financial information system maintained by FMSO is another major CDA effort for FMSO. These systems are used to help manage major investment appropriations such as ship's construction and aircraft procurement funds, operations and maintenance funds, and research, development, test and evaluation funds. Similarly, the Management Information System for International Logistics, known as MISIL, is yet another information system maintained by FMSO. The MISIL system is used by the Navy International Logistics Office in Philadelphia to process material requisitions from foreign navies.

A special project sponsored by NAVSUP has recently been receiving a great deal of attention by FMSO. This project is the "resolicitation" effort whose purpose is to identify and acquire the computer necessary to serve the needs of the two ICPs in the 1980s and beyond. This project has resulted in the installation of new IBM mainframe computers at the ICPs, thereby correcting some of the recent problems connected with the overloading of the previous hardware. FMSO is also writing much of the new software that will capitalize on the improved capabilities of the new computers. This effort to increase the efficiency of the ICPs through improvements in software is called "resystemization".

Retail Navy Stock Fund Manager: FMSO is the supply system's central manager for the $3 billion plus stock point portion of the retail Navy stock fund. The fund is used by the stock points to finance the procurement of the items under the wholesale management of non-Navy activities such as DLA or GSA.

Operations Analysis: FMSO's operations analysis mission involves a multitude of functions. The Operations Analysis Department within FMSO conducts analyses in logistics management using various mathematical, statistical and economic analysis techniques. For example, FMSO estimated the economic cost to the Navy of transitioning from the fleet logistics support improvement program (FLSIP) to the modified FLSIP (MOD-FLSIP) allowances and going from a two ocean, fleet item load list (FILL) to a single FILL. They provide both management alternatives and the associated cost benefit analyses to Navy decision makers.

Supply Operations Support: The supply operations support mission involves development of supply catalogs, the defective material reporting system, prepositioned war reserve interrogation and readiness reporting system and change notice processing. For example, FMSO compiles and distributes the afloat shopping guide (ASG).

International Logistics: The international logistics mission includes developing standardized supply procedures, on-site assistance and automation of supply systems for allied military services.

BASIC INVENTORY THEORY, TERMINOLOGY AND MODELS

Introduction

The chapters that follow this chapter will present the detailed models that the Navy uses to manage the various levels of inventories it owns. The following section introduces some of the basic terminology and theory on which the actual models are based. Additionally, this section will illustrate the conventional reasons for and costs of owning inventory, along with the unique purposes associated with military inventory management. The basic inventory theory presented in the following sections is derived largely from Richard J. Tersine's book entitled Principles of Inventory and Materials Management.

Functions of Inventory

The existence of inventories can be explained by four functional factors:

- Time
- Decoupling
- Uncertainty
- Economy

Time Factor: The time factor involves the long process of production and distribution required before goods reach the final consumer. Time is required to develop the production schedule, make raw material requisitions, ship raw material from suppliers (transit time), inspect raw materials, produce the product, and ship the product to the wholesaler or consumer (transit time). Few consumers would be willing to wait for such an extended period of time on all their purchases. Keeping inventories enables a supplying organization to reduce the lead time in meeting demand.

Decoupling Factor: Decoupling allows the treatment of various dependent operations (retailing, distribution, warehousing, manufacturing and purchasing) in an independent and economical manner. Inventories make it unnecessary to gear production directly to consumption. Inventories free one stage in the supply-production-distribution process from the next, permitting each to operate more economically. The decoupling function permits the firm to schedule many operations at a more desirable performance level than if they were integrated dependently.

Uncertainty Factor: This factor concerns unforeseen events that modify the original plans of the organization. It includes errors in demand estimates, variable production yields, equipment breakdowns, strikes, acts of God, shipping delays, and unusual weather conditions. When inventory is available, the organization has some protection from unanticipated or unplanned occurrences.

Economy Factor: This permits the organization to take advantage of cost reducing alternatives. It enables an organization to purchase or produce items in economic quantities. Bulk purchases with quantity discounts can reduce procurement costs significantly. Per unit costs can be excessive if items are ordered separately without regard to transportation and lot size economies.

The four factors just described are the classic reasons that commercial organizations maintain inventories. These inventory functions are all valid for military organizations, but the primary purpose for providing military inventories is to provide supply support to the fighting units of the fleets. The key element of this goal is clearly the objective of attaining a high level of operational readiness in all equipment necessary for ship's mission. The point to be made here is that, at times, the Navy's goal of maximizing operational readiness may be at odds with the classic inventory management goals of minimizing costs.

The Nature of an Inventory Problem

The nature of an inventory problem can be classified in many ways. It can be classified according to the repetitiveness of the inventory decision, the source of supply, the knowledge about future demand, the knowledge of the lead time and the type of inventory system. The usual forms of each classification are listed below:

1. Repetitiveness
    a. Single order
    b. Repeat order

2. Supply source
    a. Outside supply
    b. Inside supply (manufacture)

3. Knowledge of future demand
    a. Constant demand
    b. Variable demand

4. Knowledge of lead time
    a. Constant lead time
    b. Variable lead time

5. Type of review of the inventory position
    a. Continuous review
    b. Periodic review

6. Specific replenishment process
    a. Q system
    b. Min-max system
    c. P system
    d. T, R, M system
    e. Material requirements planning (MRP)

There are other ways of subdividing the inventory problem, but the classifications given above indicate the major dimensions of the problems that can be encountered.

To help solve the problems of inventory, it is necessary to build mathematical models which describe the inventory situation. Since it is never possible to represent the real world with total accuracy, approximations and simplifications must be made during the model-building process. These deviations from reality are necessary for the practical reasons that:

- It is impossible to determine exactly what the real world is really (or will be) like.
- A very close approximation of reality would be mathematically intractable.
- Extremely accurate models can be so expensive that their final benefit does not justify the cost of building, maintaining and running the model.

The relevance of a model to a given situation must be based on the reasonableness of its assumptions and limitations. Additionally, a model must be targeted to achieve some measure(s) of effectiveness (MOE). Some examples of MOEs that are frequently used by the Navy include:

- Total cost
- System material availability (SMA)
- Net and gross availability
- Manpower constraints
- Storage constraints
- System operational availability (A_o)

The Navy's use of measures of effectiveness to evaluate supply system performance are discussed in a later section.

Inventory Decisions and Operating Doctrine

The basic questions that every inventory manager must address are:

1. How much to order, repair or produce (reorder quantity - Q)?
2. When to order, repair or produce (reorder point - R)?
3. Where to repair material?
4. Where to store the inventory?

In addition, there are several important questions which must be answered when setting up or modifying the inventory management system itself:

1. How will forecasting be done?
2. Which specific inventory model will be used?
3. When will the inventory position be reviewed (continuous or periodic) to see if the reorder point has been reached?

4. What specific information and computer systems will be used to assist the inventory management process?
5. What specific facilities will be used to store, repair and tranship inventory?
6. What people and organizational structure will be used to store, repair, ship and manage the inventories?

In the classical intuitive description of the problem, to the inventory manager with no constraints on resources, the question of how much to buy is simply a matter of the customer service level desired. The manager, without any constraints on resources, can provide the required level of service by either placing a single order large enough so he will never run out of stock, or else he may order as frequently as demands occur (provided lead time is no problem). However, in the real world of scarce resources, the Navy inventory manager must consider the cost and availability of storage space, the cost to place an order, the investment cost of material purchased and inventory obsolescence rates. The next section discusses the costs of inventory.

Costs of Inventory

The objective of inventory magement is to have the appropriate amounts of raw materials, supplies and finished goods in the right place, at the right time and at low cost. Inventory costs result from action or lack of action by management in establishing the inventory system. The costs of inventory that are important to the Navy include:

- The cost of the inventory management system itself.
- Holding cost.
- The value of the material held in inventory.
- Order costs (also called setup or replenishment cost). This is the fixed cost associated with a reorder.
- Shortage (also known as stockout) cost.
- In-transit holding (normally this cost does not figure in Navy cost computations).
- Transportation cost.

Both the intuitive and the mathematical approaches to modern inventory control systems seek to balance, and thereby minimize the total annual costs of operations. The total cost equation can be generally described as:

Annual cost of buying the parts
+ Annual cost of ordering the parts
+ Annual cost of storing (holding) the parts
+ Annual cost of shortages
TOTAL ANNUAL COSTS

The ordering, holding and shortage costs are referred to as variable costs, because they vary with the operating doctrine and management's approach to inventory policy. DOD instructions provide definitions of these costs for military inventory models at the wholesale level:

1. **Order Costs** - DOD Instruction 4140.39 defines the cost components that the Services may include in this element. These primarily consist of the salaries of personnel involved in inventory control and contracting, plus supplies and data processing costs used to determine and process buys, plus the stock point's receipt and stowage costs.[1]

2. **Holding Costs** - DOD Instruction 4140.39 also describes the elements of holding costs to be used by the Services. An investment or opportunity cost, the cost of losses due to obsolescence and other losses such as pilferage and storage costs are specific elements of holding cost. Holding costs are computed using a holding cost rate (I) which is expressed as a percent per year of the on-hand inventory dollar value.

3. **Shortage or Backorder Costs** - Conceptually, shortage or backorder costs are the actual cost of not having an item available when the customer needs it. In the military environment it is extremely difficult (and politically infeasible) to obtain dollar values for the costs of shortage, as it may involve placing a dollar value on the loss of a life. DOD Instruction 4140.39 permits the military to use implied shortage costs as a management parameter based on the funds available for investment in inventories and in the management of these inventories.

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[1] Most wholesale level stock in the Navy inventory is stored at various stock points, often in the same bin as the stock point's retail intermediate material.

For a majority of Navy applications, the cost to hold inventories constitutes a large portion of the inventory system expense. This cost is determined by assuming the annual holding cost rate, I, to be a percentage of the unit price of the item in inventory. The components of the annual holding cost rate are shown below for consumable and for repairable items.

For Consumable Items:

▪ Time value of money:	10%
▪ Warehousing:	1%
▪ Obsolescence:	10%
▪ Theft & Shrinkage:	2%
Total:	23% per year

For Repairable Items:

▪ Time value of money:	10%
▪ Warehousing:	1%
▪ Obsolescence:	10%
▪ Theft & Shrinkage:	0%
Total:	21% per year

The Basic Inventory Models: Continuous and Periodic

The two basic model structures that have evolved from considerations of costs, management control, and accounting practices are the continuous review and periodic review systems. The more realistic models evolve from these basic ones and will be explained in detail in later chapters.

Continuous Review Models

The first continuous review model presented here is called the Q-system. It can be used for consumable items and allows for uncertain demand and procurement leadtimes. In addition, backorders[2] are allowed and those demands associated with backorders will be filled as soon as stock becomes available from reorders placed by the inventory manager.

In this model we assume that the inventory position (on-hand plus on-order minus backorders) is monitored continuously using a transaction reporting system. This way the exact time to place an order (for more stock for the inventory) can be correctly determined. This exact time to reorder is identified by comparing the inventory position to a quantity called the reorder point. The reorder point is one of the two decision variables in the Q-system, and is given the symbol *R*. You will see variants of this symbol, such as R_2, in various sections of this publication.

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[2] Items are promised to one or more customers of the facility holding the inventory.

Once the reorder point is determined in the Q-system, the amount to order when an order is placed is called the reorder quantity and is given the symbol, *Q*. It is the second of the two decision variables used in the Q-system. In the Navy supply system, the size of the reorder quantity is based on some form of the economic order quantity (EOQ) formula. The reorder quantity will remain the same for each reorder cycle, provided the forecasted demand and item cost remain constant.

In order to find the appropriate values for *Q* and *R*, we must define a measure of effectiveness by which to judge our choice of values. The measure of effectiveness used by the Navy at the wholesale level is the total annual variable operating cost. In other words, we find the values of *Q* and *R* that balance annualized ordering, holding and backorder costs. The Navy's wholesale models also subject *Q* and *R* to various constraints related to shelf life, manpower limitations, stockout probabilities, life-of-type conditions and other conditions. At this time, however, we will postpone discussion of these constraints until Chapter 3. This way, we can concentrate on the basic ideas involved with balancing ordering, holding and backorder costs.

Another type of continuous review system is the min-max system. This is the type of inventory control system which the Navy actually uses at the wholesale level. The decision variables used in the min-max system are the same as the decision variables used in the Q-system.

In the min-max system, a replenishment order is triggered when the on-hand quantity reaches or falls below the reorder level, *R*. This differs from the Q-system in that the Q-system places a replenishment order when the inventory position *exactly* reaches *R*. When customers can requisition material in quantities larger than one unit, its possible for the next demand (requisition) to take the inventory position *below R* instantaneously. The Q-system of control isn't designed to deal with this, thus we have the min-max system. Under the min-max system, the replenishment quantity is increased (from *Q*) by the amount of the deficit between the reorder point quantity (*R*) and the inventory position at the time the order is placed. A side benefit of this process is that it gives the Navy an easy method for increasing the size of the replenishment order when there are pre-planned requirements for material in support of depot overhauls, ship reworks, and other preventive maintenance and modification work.

Graphically, the reorder level and the changes in on-hand inventory over time for a continuous review model with variable demand and lead time can be depicted as shown in Figure (13). This figure shows net inventory (on-hand - backorders) versus time.

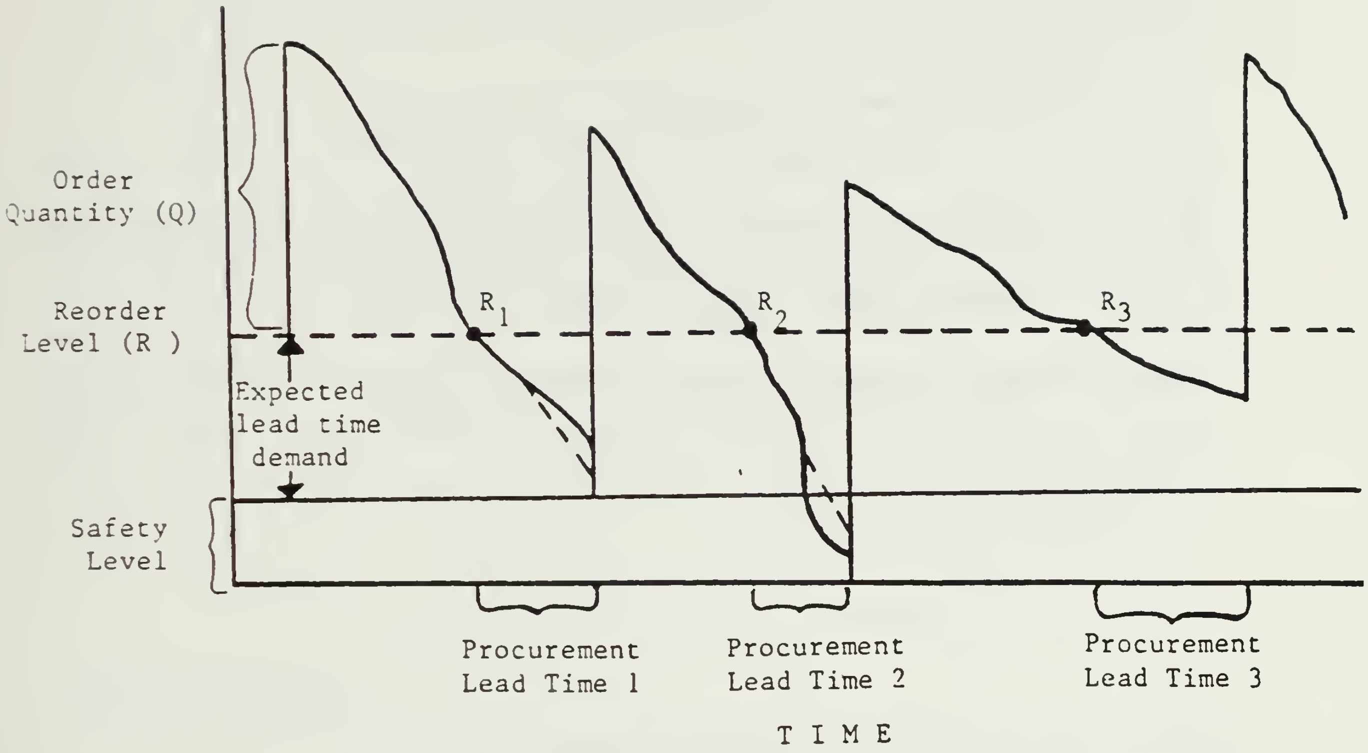
Order Quantity (Q)
Reorder Level (R)
Expected lead time demand
Safety Level
R_1
R_2
R_3
Procurement Lead Time 1
Procurement Lead Time 2
Procurement Lead Time 3
T I M E

Figure 13. A Continuous Review Inventory System

Notice that the order quantity (Q) is the same for every order and the time between orders varies. In the simplest approach to this model, the optimal order quantity Q is that value which minimizes the ordering and holding costs. For a consumable item this results in:

$$Q = \sqrt{\frac{8AD}{IC}}$$

where:
A = The administrative order cost
D = Average quarterly demand
I = The holding cost rate including consideration of investment cost, storage, obsolescence and losses
C = The replacement cost of the item

The Reorder Level (R) for a consumable is determined from minimizing the costs of carrying safety level and of incurring backorders. It is a function of leadtime demand and the variability of demand. The formula for R is:

$$R = (D \times L) + SL$$

where:
D = Average quarterly demand
L = The procurement lead time in quarters
SL = Safety level, a function of demand and lead time variability

The concept of risk or the probability of stockout provides a systematic basis for translating customer service requirements and economics into safety levels. The use of risk to establish safety levels will be discussed in depth in later chapters.

Example Problem: Suppose you manage a consumable item with the characteristics shown below. Here's how you would use the EOQ formula, without additional constraints, to compute the order quantity and reorder point.

D = 20 units per quarter
I = .23
L = 4.8 quarters

A = $150
C = $285
SL = 4 units

Then:

$$Q = \sqrt{\frac{(8)(20)(150)}{(.23)(285)}} = 19.13$$

Q is usually rounded up, in this case, to 20.

Next:

$$R = (20)(4.8) + 4 = 100$$

A more comprehensive description of the consumable model and the extensions needed to handle repairable items are provided in Chapter 3.

Periodic Review Models

The periodic review system is based on a policy of reviewing and ordering at fixed regular intervals. One type of periodic review system is referred to as the P-system. In this control system, the inventory position is checked at the end of every T time units. If the inventory position is found to be below a level called the requisitioning objective (RO), then an order is placed which is large enough to bring the inventory position back up to the level of the RO. Note that the actual quantity purchased will vary from order to order.

In the P-system, the two decision variables are our choice of value for T, the review interval, and for RO, the requisitioning objective. Because orders are placed at predetermined intervals without examining the stock position at times between orders, the value of *RO* should be set equal to the expected demand between reorders, plus some allowance for the variability of demand. Higher levels of inventory are required under the P-system than for continuous review systems under similar demand rates and procurement lead times.

There is another type of periodic review system that combines the features of the min-max and P-systems. It is called the T,R,RO system. In this system the inventory level is reviewed every T units of time to see if the inventory position has dropped below the reorder point (*R*, the same type of reorder point as is used in the min-max system). If so, a replenishment order is placed which will bring the inventory position up to the level of the requisitioning objective, *RO* . Under the T,R,RO system there are three decision variables: the review interval, *T*; the reorder point, *R*; and the requisitioning objective, *RO*.

Figure (14) is a graph of net inventory over time for an inventory managed under the P-system of inventory control.

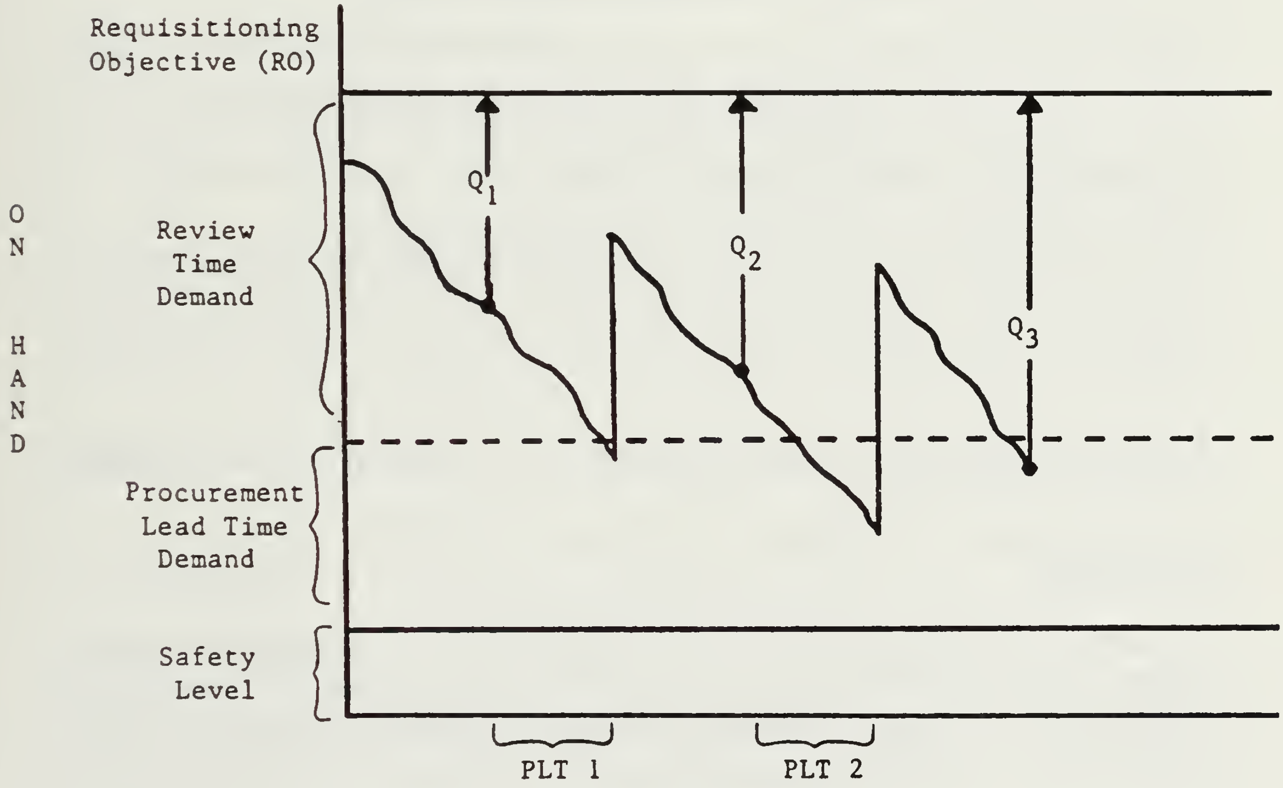

Figure 14. A Periodic Review Inventory System

The target requisitioning objective (*RO*) must include at least the sum of the expected demand during one procurement lead time, plus one review time, plus safety level, if any. Order quantities are simply the difference between the RO and the on-hand inventory at the time of the review. Although a higher investment level is required for this type of system, the additional costs are partially offset by lower clerical and data processing costs obtained by performing only periodic reviews of the inventory system. A periodic review system may be the most economical system for inexpensive items, when review and processing costs are high, and item investment and storage costs are low, or when the cost of operating a continuous review system is prohibitive. The requisitioning objective (*RO*) for the periodic review (P-system) model is defined as:

$$RO = (D \times L) + (D \times T) + SL$$

where:
D = Average quarterly demand
L = Procurement leadtime in quarters
T = The length of the review period in quarters
SL = Safety level, a function of demand and leadtime variability

Although the mathematical models for periodic review control processes are infrequently used in Navy inventory applications, they are presented for comparison and contrast with the continuous review model. In reality, periodic review is used by SPCC and ASO when they review stock levels during a process called supply demand review (SDR). The SDR program is run on a periodic basis (typically twice a month, i.e. T = 2 weeks). If the reorder point has been passed, then they order Q plus whatever deficit exists below the reorder point, i.e. they order up to *RO*. This is the T,R,RO system of inventory control.[3]

PERFORMANCE MEASURES OF EFFECTIVENESS

Introduction

Measurements for guaging how well the supply and inventory system performs, and how reliably a weapon system performs provide feedback to the requirements determination process at both the program support ICP and at the retail level. The measure of effectiveness (MOE) is used to judge the decision maker's choices of values for the decision variables. Finding the appropriate measure of effectiveness (MOE) has always been a difficult problem because as we define MOEs which better represent our ultimate objectives, the amount and type of data required to compute the MOE increases, the mathematics involved becomes more difficult, and the cost of obtaining the measurement increases. All MOE's fall into three basic categories:

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[3] However, ASO and SPCC use the mathematical model associated with the min-max system of inventory control, since the SDR program is run fairly frequently. (The original intention was to run the SDR program at the end of every day. This was never done because of limitations inherent in the computer hardware at ASO and SPCC. Also, postponing the running of the SDR program is sometimes used to postpone the expenditure of funds.)

- Cost type MOEs.
- MOEs which give an indication of how well the supply system is providing material to the customer.
- Miscellaneous MOEs.

Unfortunately, these various inventory system MOE categories have numerous tradeoffs, i.e. as we make changes in the decision variables to obtain an improvement in one MOE, another MOE may worsen. The most significant conflict is the one between MOEs which represent cost (which we wish to minimize) and the MOEs which represent customer service (which we wish to maximize). In the ever competitive environment for scarce budget resources, the latest development has been to measure effectiveness by attempting to directly match resources to readiness.

This following section will discuss the:

1. MOEs actually in current use by Navy decision makers.
2. MOEs which will be or may be used by Navy decision makers in the future.

Current Measures of Effectiveness

Many MOEs are in use today by all inventory levels in the supply system. Some of the major MOEs include the following:

Total Costs

This is the total cost of holding, of ordering and of shortages. It is typically measured on an annual basis.

Specific Cost Measures

These MOEs monitor expenditures in specific cost areas such as:

- Research, testing, development and evaluation (RDT&E).
- Operations and maintenance (O&M).
- Other procurement - Navy (OPN).
- Transportation.
- Navy stock fund (NSF).

- Appropriated purchases account (APA).

System Material Availability (SMA)

SMA, a customer service measure for the wholesale level, is defined as the percent of requisitions which are satisfied on the first pass against system assets and is prepared monthly by a Uniformed Inventory Control Point (UICP) program known as M67. It is computed as follows:

$$SMA(\%) = 100 \times \left[1.0 - \frac{\text{Backorders Established} + \text{DVDs Established}}{\text{Demand}} \right]$$

or, alternatively as:

$$SMA(\%) = 100 \times \left[1.0 - \frac{\text{MOE}}{\text{Demand}} \right]$$

where:

DVD = Direct Vendor Deliveries

MOE = Material Obligations Established = Backorders + DVDs

The current Navy goal for wholesale SMA is 85 percent.

Gross Effectiveness

This MOE is the percent of total requisitions, for both stocked and non-stocked items, received and satisfied from stock on-hand at any given echelon of inventory. Gross effectiveness is mainly used by the stock points and the retail consumer level supply departments as a measure of customer service.

Net Effectiveness

This MOE is the percent of total requisitions, for stocked items, received and satisfied from stock on-hand. Again, the stock points and retail consumer levels use this as a measure of customer service.

Miscellaneous Measures of Effectiveness

Some miscellaneous MOEs used by supply system decision makers include the following:

- Measures of contract competition and breakout.
- Average days to stow receipts at a stock point.
- Warehouse refusal rate at a stock point.

- Effectiveness rates by material cognizance group.
- Inventory accuracy audit results.
- Transportation times.
- Procurement action lead times (contract order times).
- Material obligations outstanding.

There are, of course, many other MOEs, but those listed above provide an idea of the various supply system variables that must be measured.

Measures of Effectiveness for the Future

This section describes some MOEs that will be applied to evaluate the supply system in the future. The following MOEs are in some stage of development or use by the supply system:

Operational Availability (A_o)

The supply system is but one key input to our military readiness posture. A_o is the official Navy measure of weapon system performance. It is a measure of readiness and as such provides an indicator of hardware, fleet and total supply system performance. A_o is not measured on a regular basis for all weapon systems but can be estimated as required from Casualty Reports (CASREPS) or reports on not mission capable-supply (NMCS) partially mission capable supply (PMCS) and maintenance and material management (3M) data. A_o is the probability that a system or equipment, when used under stated conditions in an actual operational environment, will operate satisfactorily when called upon [Blanchard, p. 65]. In concept the formula for A_o is:

$$A_o = \frac{UPTIME}{UPTIME + DOWNTIME}$$

In Navy use the formula for A_o is

$$A_o = \frac{MTBF}{MTBF + MTTR + MSRT}$$

where:
MTBF = Mean time between failures;
MTTR = Mean time to repair;
MSRT = Mean supply response time.

Operational availability is used to assist in the weapon system and major end item design process. It is also used in the creation of a few shipboard allowance lists. Eventually, A_o may be incorporated in some inventory requirements determination models.

Mean Supply Response Time (MSRT)

From the operational availability formula it is simple to observe that any reduction in the MSRT will increase A_o. MSRT will be used very soon for wholesale level provisioning and may be used in the more distant future for wholesale requirements determination. Chapters 2 and 4 further discuss A_o both as a performance measure and as a basis for inventory levels decisions.

Average Customer Wait Time (ACWT)

ACWT is a primary performance measure linking supply responsiveness to operational requirements. It is an MOE required by the DOD Retail Inventory Management and Stockage Policy (RIMSTOP). However, it isn't measured or used as such because there is no Navy-wide system available to obtain the data necessary to measure ACWT. Despite this fact, target goals have been established for ACWT. There are different goals for each issue priority group (IPG), and for CONUS and EXCONUS situations.

ACWT represents the average time required in the supply system to satisfy maintenance related demands, regardless of whether the demand was for a stocked or non-stocked item. ACWT is the collective goal for supply system response time for all customer demands, as measured from requisition generation until receipt of the material by the customer, including requisition submission and receipt take-up times. ACWT is ultimately expressed in hours. It depends on other performance measures (i.e., requisition processing times, gross availability at retail and wholsale levels and required transportation times). Shortfalls in availability at one echelon of supply may be compensated for by higher availability in another echelon.

The primary objective of the Navy supply system is to provide timely supply support to Navy operating forces and Naval activities. For example, the current average customer wait time goal for continental U.S. customers is 125 hours for items in issue priority groups I and II.[4] A shorter ACWT goal may be assigned for items which are part of a specific system or equipment if such assignment is required to support a higher readiness requirement specified by the Chief of Naval Operations (CNO). The achievement of the 125 hour ACWT goal is an integration of goals for requisition processing time, gross availability at the consumer level of inventory, gross availability at the intermediate level of inventory, gross availability at the wholesale level of inventory and transportation times. The goals for these variables are shown in Figure (15).

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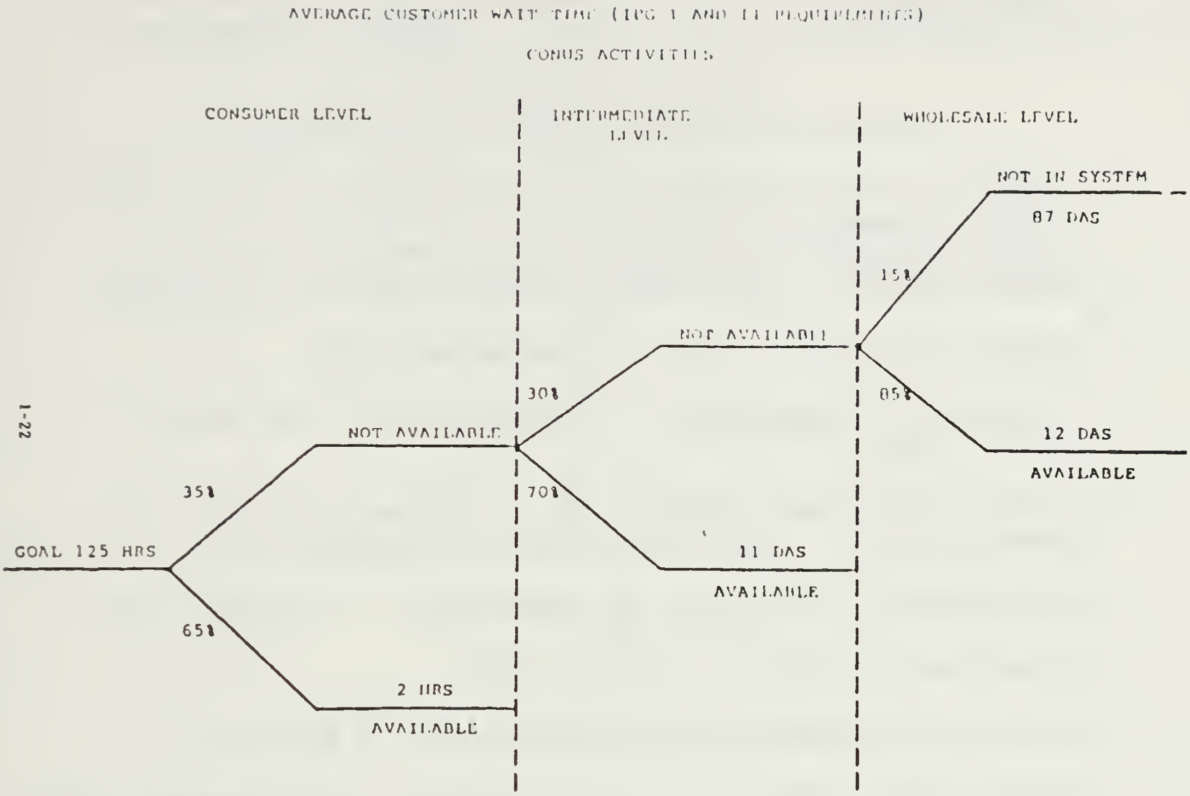
[4] IPG I and II requisitions are the most critical material requisitions.


AVERAGE CUSTOMER WAIT TIME (IPG I AND II REQUIREMENTS)
CONUS ACTIVITIES
CONSUMER LEVEL
INTERMEDIATE LEVEL
WHOLESALE LEVEL
1-22
GOAL 125 HRS
35%
65%
NOT AVAILABLE
2 HRS
AVAILABLE
30%
70%
NOT AVAILABLE
11 DAS
AVAILABLE
15%
85%
NOT IN SYSTEM
87 DAS
12 DAS
AVAILABLE

NOTE: Since AVCALs shall have a gross availability of 75% the ACWT Goal is 90 hours in CONUS

Figure 15. Average Customer Wait Time (IPG I and II requirements): Source - OPNAVINST 4441.12B.

SUMMARY

This chapter has provided an overview of the organization, decision variables, performance measures, and control processes used by the Navy in the management of its inventories. In order to understand the Navy's complex inventory management system, you must begin with the basic information provided in this introductory chapter. The following chapters will provide substantially more depth and detail about this complex system of interacting and competing goals.

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